D Station Flow and Control Improvements

Project Specifications, Bid Proposal & Contract Documents

Owner

PUBLIC UTILITY DISTRICT NO. 1

of Whatcom County 1705 Trigg Road Ferndale, Washington 98248

Telephone: (360) 384 – 4288 Facsimile: (360) 384 – 4849

General Manager, Chris Heimgartner

February 28, 2024

D STATION-FLOW AND CONTROL IMPROVEMENTS

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BID PROCEDURES, CONDITIONS AND FORMS

INVITATION FOR PROPOSALS

D Station -Flow and Control Improvements

The Public Utility District No. 1 of Whatcom County (Whatcom PUD) hereby invites qualified Contractors to submit Bid Proposals to complete the work as detailed in the Project Specifications.

For information regarding this Invitation for Proposals, contact Garrett Love-Smith, Project Manager, Whatcom PUD, garretl@pudwhatcom.org, at telephone number (360) 384-4288 ext. 26 or facsimile number (360) 384-4849.

Firms unfamiliar with such work and associated codes and safety regulations will not be considered.

Sealed Bid Proposals will be received by Whatcom PUD (Attention: Mr. Chris Heimgartner), at 1705 Trigg Road, Ferndale, Washington 98248, until **10:00 a.m**., local time, on the **29th day of March**, **2024** and then will be publicly opened and read out loud. Bids received after the time and date specified shall be considered non-responsive and will not be accepted by Whatcom PUD. Faxed or emailed bids shall not be accepted. To ensure consideration, the bid must be enclosed in an envelope marked, "Sealed Bid: D STATION- FLOW AND CONTROL IMPROVEMENTS". Bid Proposals not completed in the manner specified in the "Instruction to Bidders" of the Contract Documents/Specifications may be considered non-responsive.

Whatcom PUD reserves the right to reject any or all Bid Proposals, and to waive any informality in the bid or in the bidding process.

All Bidders shall include with the Bid Proposal a deposit in cash, certified check, cashier's check or surety bond in an amount equal to five percent (5%) of the total amount of the bid proposal. Should the successful bidder fail to enter into such contract and furnish 'satisfactory' Performance Bond, and Labor & Material Payment Bond within the time stated in the specifications, the Bid Proposal deposit shall be forfeited to Whatcom PUD. This contract is subject to Washington State Prevailing Wage Requirements (RCW 39.12). As of January 1, 2020 all Prevailing Wage projects require use of the online Prevailing Wage portal for filing required documents, and all contractors if not already exempt from Prevailing Wage Training must complete Prevailing Wage Training.

Women or minority owned business enterprise participation is not a requirement of this project, however, involvement is encouraged.

Bidders, prior to submittal of a bid, shall ask the project manager for information regarding access to property. No Pre-bid meeting is planned for the project.

Chris Heimgartner General Manager

INSTRUCTIONS TO BIDDERS

1. CONTRACT DOCUMENTS

Complete sets of Bid Proposal/Contract Documents may be obtained from Public Utility District No. 1 of Whatcom County (Whatcom PUD) for **\$0.00**, **No Cost** and shall be used in preparing Bids.

Whatcom PUD shall not assume any responsibility for errors or misinterpretations resulting from any use of the Contract Documents.

Should a bidder find discrepancies, omissions, or points of doubtful meaning in the Documents, they shall notify the Whatcom PUD Project Manager at least four days (96 hours) before bid opening. Questions received less than four days (96 hours) before the time set for the bid opening shall not be answered. Any interpretation or change in the Contract Documents will be made only in writing, in the form of Addenda to the Contract Documents, which will be furnished to all holders of Contract Documents. Bidders shall submit and/or acknowledge with their Bid Proposals all Addenda. Whatcom PUD will not be responsible for any other explanation or interpretations of said Documents.

2. BIDDER QUALIFICATIONS.

In order for Bid Proposals to be considered and to complete the Work included in the Scope of Work, the Bidder shall be a licensed Contractor in the State of Washington and be authorized to conduct business in Whatcom County.

3. GENERAL DESCRIPTION OF THE PROJECT

General Description of the work to be done is contained in the Invitation for Proposals and the PUD **D Station -Flow and Control Improvements** Specifications.

4. <u>BIDDER'S UNDERSTANDING</u>

Each Bidder must inform themselves of the conditions relating to the execution of the Work. It is required that the Bidder inspects the sites and makes themselves thoroughly familiar with all the Contract Documents and project requirements. Prior to submitting a Bid, Bidders shall be responsible for thorough examination of the Contract Documents, investigation of all site and subsurface conditions, and notification to Whatcom PUD of any conflicts, errors, or ambiguities discovered in the Contract Documents.

Each Bidder shall inform themselves of, and the Bidder awarded a Contract shall comply with, federal, state, and local laws, statutes, and ordinances relative to the execution of the work. This requirement includes, but is not limited to, applicable regulations concerning minimum wage rates and payment of prevailing wages, nondiscrimination in the employment of labor, protection of public and employee safety and health, confined spaces, environmental protection, the protection of natural resources, fire protection, permits, inspections, fees, taxes, and other applied regulations.

5. STATE AND LOCAL SALES AND USE TAXES

All taxes as required by the laws and statutes of the State of Washington and its political subdivisions shall be included in the bid amount and paid by the Contractor.

6. <u>TYPE OF BID PROPOSAL</u>

The Bid Proposal for the Contract is to be submitted on a Lump Sum basis.

7. PREPARATION OF BID PROPOSALS

A. GENERAL

Bidders shall submit all information required to be in the Bid Proposal unless otherwise noted. All blank spaces in the Bid Proposal form must be typed or filled in by hand, as required, in BLACK or BLUE ink. No changes shall be made in the phraseology of the forms.

The Bidder shall acknowledge receipt of all addenda in the Bid Proposal. Bid Proposals received without acknowledgment or without the Addendum enclosed may be considered non-responsive.

B. REGISTRATION REQUIREMENTS FOR CONTRACTORS

All Bidders shall be allowed to conduct business or complete Sales Transactions in the State of Washington and Whatcom County and be licensed as applicable to the type of work or material supply bid upon.

C. SIGNATURE

The Bidder shall sign the Bid Proposal in the blank space provided. If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If Bidder is a partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign contracts in behalf of the partnership. If signature is by an agent, other than an officer of a corporation or a member of a partnership, a notarized power-of-attorney must be on file with Whatcom PUD prior to opening of Bid Proposals or submitted with the Bid Proposal, otherwise the Bid Proposal will be regarded as not properly authorized and may be considered non-responsive.

8. SUBMISSION OF BID PROPOSALS

All Bid Proposals must be submitted no later than the time prescribed, at the place, and in the manner set forth in the Invitation for Proposals. When provided, Bid Proposals must be made on the Bid Proposal forms, and submitted intact as a signed original proposal with the Bidding Requirements, Contract Forms, and Conditions of the Contract.

Each Bid Proposal must be submitted in a sealed envelope and addressed in conformance with the instructions in the Invitation for Proposals with the notation **"D Station- Flow and Control Improvements"** on the face thereof.

9. AWARD OF CONTRACT

Whatcom PUD may conduct such investigations as it deems necessary to assist in the evaluation of any Bid Proposal and to establish the responsibility, qualifications, and financial ability of Bidders to perform and furnish the work in compliance with the Contract Documents to Whatcom PUD's satisfaction within the prescribed time.

If the Contract is to be awarded, Whatcom PUD will give the successful Bidder a Notice of Award within fifteen (15) working days after the day of the bid opening.

10. BASIS OF AWARD

Whatcom PUD reserves the right to reject any and all Bid Proposals, to negotiate Contract terms with any of the Bidders, and the right to disregard all nonconforming, non-responsive, unbalanced or conditional bids. Note: Whatcom PUD will not base the selection solely on cost.

Whatcom PUD may contact firms that submit a Bid Proposal to obtain additional information needed to make the selection. All firms that submit a Bid Proposal will be notified of the selection.

11. EXECUTION OF AGREEMENT

This Contract is agreed to be completed both with regards to the execution of the documents and Work in a timely manner. The successful Bidder shall, within ten (10) working days after receiving Notice of Award, sign and deliver to Whatcom PUD a Contract. Within ten (10) working days after receiving the signed Contract from the successful Bidder, Whatcom PUD will sign the Contract. Signature by both parties constitutes Execution of the Contract. A Certificate of Insurance satisfying the Contract Specifications shall be submitted with the signed Contract.

12. PRE-CONSTRUCTION CONFERENCE

The successful bidder, prior to the commencement of Work, shall attend a Pre-Construction Conference with the Whatcom PUD Project Manager, and staff from Whatcom County and other interested Departments from Whatcom County, State of Washington or the City of Ferndale.

13. CONTRACT BONDS

A. PERFORMANCE BOND AND PAYMENT BOND

The successful Bidder shall file with Whatcom PUD at the time of Notice to Proceed with each task, a Performance Bond and Labor & Material Bond on the forms bound herewith in the amount of each task as security for the faithful performance of the Contract and the payment of all persons supplying labor, and materials for the construction of the Work, and to cover all guarantees against defective workmanship or materials, or both, during the warranty period following the date of Substantial Completion of the work by Whatcom PUD and shall be authorized to do business in the State of Washington.

B. POWER-OF-ATTORNEY

The Attorney-in-Fact (Resident Agent) who executes this Performance Bond and Labor & Material Bond in behalf of the Surety must attach a notarized copy of their power-ofattorney as evidence of their authority to bind the Surety on the date of execution of the bond.

If, at any time, after execution of the Contract and the furnishing of the required Surety Bond(s), Whatcom PUD determines the Surety or Sureties upon such Bond(s) to be unsatisfactory of if, for any reason such Bond(s) ceases to be adequate to cover the performance of the Work, the Contractor shall, at its expense, within five (5) working days after receipt of notice from Whatcom PUD to do so, furnish an additional Bond(s) in such form and amount with such Surety or Sureties as will be satisfactory to Whatcom PUD. In such event, no further payment to the Contractor shall be deemed to be due under this Contract until such new or additional security as required shall be furnished in a manner and form satisfactory to Whatcom PUD.

14. INTERPRETATIONS

Questions regarding Specifications should be addressed to Garrett Love-Smith; the Whatcom PUD Project Manager, garrettl@pudwhatcom.org, (360) 384 - 4288 ext. 26, or at Facsimile (360) 384 - 4849 and will be answered by addenda to all bidders.

Whatcom PUD will not be responsible for oral answers or interpretations. No statement regarding the work, except as made by bidding documents or addenda thereto, shall be binding upon Whatcom PUD. Should a bidder find discrepancies, omissions, or points of doubtful meaning in the Documents, they shall notify the Whatcom PUD Project Manager at least four days (96 hours) before bid opening. Questions received less than four days (96 hours) before the time set for the bid opening shall not be answered.

All addenda issued during the bidding period will be incorporated into the Contract. Each bidder must acknowledge each addendum issued, in the space provided on the bid form, in order to have their bid considered.

* * * * * *

BID PROPOSAL

<i>To</i> :		Public Utility District No. 1 of V 1705 Trigg Road Ferndale, Washington 98248	WHATCOM COUN	ГҮ			
ATTENTION:		Mr. Chris Heimgartner, General	MR. CHRIS HEIMGARTNER, GENERAL MANAGER				
BID P	ROPOSAL FOR	: D Station- Flow and Control Im	IPROVEMENTS				
BIDD	ER						
Сомр	ANY:						
Addr	ESS:						
CITY, J	State, Zip Co	DDE:					
WOR	K ITEMS						
<u>No</u> .	Qty	Description	Unit Price		Total Price		
1.	1 LS	MOBILIZATION:	.\$ <u>Lump Sum</u>	_ \$			
2.	1 LS	TRENCH SAFETY AND SHORING	. \$ <u>Lump Sum</u>	_ \$	DOLLARS		
3.	1 LS	STAKING AND PROJECT CONTROL	. \$ <u>Lump Sum</u>	_ \$	Dollars		
					Dollars		
4.	1 LS	SEDIMENTATION AND EROSION CONTROL	. \$ <u>Lump Sum</u>	_ \$	Dollars		
5.	1 LS	VAULT INSTALLATION AND EXCAVATION	. \$ <u>Lump Sum</u>	_ \$			
6.	1 LS	DUCTILE IRON PIPE AND FITTINGS	. \$ <u>Lump Sum</u>	_ \$	Dollars		
7.	50 CY	EXCAVATION	. \$	_ \$	Dollars		
8.	50CY	BACKFILL	. \$	_ \$	Dollars		
9	11.5	DEWATERING	\$ LUMP SUM	\$	Dollars		
).	1 L9			_Ψ	Dollars		

10.	1 LS	SITE RESTORATION	\$
			 Dollars
11.	1 LS	STRUCTURAL\$ <u>Lump Sum</u>	\$
			 Dollars
12.	1 LS	MECHANICAL \$ <u>Lump Sum</u>	\$
			 Dollars
13.	1 LS	Electrical\$ <u>Lump Sum</u>	\$
			 Dollars
14.	1 LS	CONSTRUCTION RECORDS	\$
			 Dollars

TOTAL:	\$
	Dollars
WRITTEN WORDS	

BIDDER'S DECLARATION of UNDERSTANDING

The Bidder declares that they have carefully examined the Contract Documents and that this Bid Proposal is made according to the provisions and under the terms of the Contract Documents, which the Documents are hereby made a part of this Bid Proposal.

The Bidder further agrees, to the extent of their Bid Proposal, to furnish all machinery, tools, apparatus, safety equipment, and other means of construction and do the work, furnish all the materials, and pay all fees necessary to complete all work as specified or indicated in the Contract Documents.

NON-COLLUSION DECLARATION

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Bid Proposal are those named herein, that this Bid Proposal is, in all respects, fair and without fraud, that it is made without collusion with any official of the Public Utility District No. 1 of Whatcom County (Whatcom PUD) or their Representative, and that the Bid Proposal is made without any connection or collusion with any person submitting another Bid Proposal on this Contract.

INSURANCE

Insurance limits are identified in the Supplementary General Conditions and further detailed in the General Conditions of the Standard Specifications.

PREVAILING WAGES

The Contractor and its Subcontractors shall comply with all requirements of the Washington State Prevailing Wage Laws, RCW 39.12.

As of January 1, 2020 all Prevailing Wage projects require use of the online Prevailing Wage portal for filing required documents, and all contractors if not already exempt from Prevailing Wage Training must complete Prevailing Wage Training.

Every Contractor and Subcontractor on every public works project must file a Statement of Intent to Pay Prevailing Wages and an Affidavit of Wages Paid. Both forms must be filed on every project. The filing of the Affidavit of Wages Paid does not set aside the requirements to also file the Statement of Intent to Pay Prevailing Wages.

Payment for Work completed by the Contractor and/or Subcontractor(s) will be delayed until such time that all required Prevailing Wage forms have been submitted to and approved by the Department of Labor and Industries and received by the Owner.

SCHEDULE

The proposed Project shall begin <u>July 8th 2024</u> and be complete by <u>No Later than 15 November</u> <u>2024</u>. Individual schedules' shall be set for each task with a deadline mutually agreed upon at their outset by the Owner and Contractor. The Owner may at any time stop the entire project or specific locations due to conditions that would damage the land owner's property.

LIQUIDATED DAMAGES

In the event the Bidder is awarded the Contract and shall fail to complete all of the contract requirements within the time limit (for each task) or extended time limit agreed upon, liquidated damages shall be paid to the Whatcom PUD at the daily rate of Two Thousand and Five Hundred Dollars (\$2500.00) until the Work has been satisfactorily completed.

ADDENDA

The Bidder hereby acknowledges that it has received Addenda No's. _____, ____,

(Bidder shall insert No. of each Addendum received) and agrees that all addenda issued are hereby made part of the Contract Documents, and the Bidder further agrees that its Bid Proposal includes all impacts resulting from said addenda.

SALES AND USE TAXES

The Bidder agrees to pay all other applicable Federal, State, and local taxes for the work herein and shall include these costs in the bid amount.

PRICE

The Bidder agrees to provide all material, labor, equipment and subcontractors as required to complete the Work to meet the Specifications on a Lump Sum basis for the PUD D Station- Flow and Control Improvements

SURETY

Performance Bond and Labor & Material Bond are required for this Contract and are included in the Contract Documents.

BIDDER IDENTIFICATION

The name of the Bidder submitting this Bid Proposal, the address and phone number to which all communications concerned with this Bid Proposal shall be made and the number which has been assigned indicating the Bidder is licensed to do business in the State of Washington area as follows:

COMPANY:
Address:
CITY, STATE, ZIP CODE:
Contractor's License No.:
Workmen's Compensation Experience Factor:
Telephone No.:
FACSIMILE NO.:
Email Address (if available):
The Firm submitting this Bid Proposal is(check one)[] Sole Proprietorship [] Partnership [] Corporation
The names/titles of the Principal officers of the Corporation submitting this Bid Proposal, or of the Partnership, or all persons interested in this Bid Proposal as Principals are as follows:

If Sole Proprietor or Partnership

IN WITNESS hereto, the undersigned set his/her hand t	his day of, 2024
	Signature of Bidder
(SEAL)	Title
If Corporation	
IN WITNESS WHEREOF the undersigned corporation	has caused this instrument to be executed and it seal
affixed by its duly authorized officer(s) this	day of, 2024.
	Name of Corporation
	By: (Authorized Signature)
	Title
(Corporate SEAL)	Attest (Secretary)
Notary for Sole Proprietor, Partnership or Corp	ooration
STATE OF WASHINGTON)) ss. COUNTY OF)	
On this day of	, 2024, before me,
,	(Name of Notary Public)
personally appeared(Name of Signer)	
[] personally known to me - or - [] pro- the personal and ack his/her a the instr- the personal ack	ved to me on the basis of satisfactory evidence to be on whose name is subscribed to the within instrument nowledged to me that he/she executed the same in authorized capacity, and that by his/her signature on ument the person, or the entity, upon behalf of which on acted, executed the instrument
	WITNESS my hand and official seal:
	Signature of Notary
	Notary Public in and for the State of Washington,
(SEAL)	Residing At:

SUBCONTRACTOR LIST

Subcontractors that are proposed to perform any work exceeding ten (10 %) percent of the Contract Price (excluding state sales tax) or to perform specific work classifications as listed below shall be identified. If no Subcontractors are proposed for this project please indicate by writing "None" in the appropriate space. This requirement is in conformance with RCW 39.30.060. **

Work Exceeding 10% of Contract Price

Subcontractor:	Work Item:
Contract Amount: \$	
Subcontractor:	Work Item:
Contract Amount: \$	
* * * *	

The Bidder acknowledges and guarantees that if awarded the contract for this project the above listed Subcontractor(s) will be utilized. If the Bidder upon being awarded the Contract is considering using a Subcontractor(s) other than those listed above he/they shall request in writing to the Owner his/their desire and reason for the change. The Owner will review the request and issue written response either accepting or denying the request.

Contractor:

Signature:

** Subcontractor List is to be submitted to Whatcom PUD no later than 3:00 p.m. on the same day that the Bid Proposals are due.

NON-COLLUSION AFFIDAVIT

I, _______, being duly sworn agent for the below (print name) identified company, on his/her oath states that the Bid Proposal submitted above is genuine and not a sham or collusive bid, or made in the interest or on behalf of any person(s) not named therein; and he/she further says that the said bidder has not directly or indirectly induced or solicited any bidder on the above work or equipment supply to put in a sham bid, or any another person(s) or corporation(s) to refrain from bidding; and that said bidder has not in any manner sought by collusion to secure to itself an advantage over other bidder or bidders.

	_	(Authorized Signature/Title)
	_	(Company Name of Contractor)
STATE OF WASHINGTON)		
COUNTY OF)	SS.	
On this	day of	, 2024, before me,
personally appeared()	Jame of Signer)	
[] personally known to me	- or -	[] proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her authorized capacity, and that by his/her signature on the instrument the person, or the entity, upon behalf of which the person acted, executed the instrument.
		WITNESS my hand and official seal:
		(Signature of Notary)
(SEAL)		Notary Public in and for the State of Washington,
		Residing at
	* * *	* * * *

BID BOND

KNOW ALL MEN BY THESE PRESENTS. that the undersigned, we, as Principal, and as Surety, are hereby held and firmly bound unto the Whatcom PUD, a Municipal Corporation in the State of Washington, in the full and penal sum of five percent (5%) of the TOTAL AMOUNT appearing on the BID PROPOSAL of said principal for the work hereinafter described, for the payment of which, well and truly to be made, we bind our heirs, executors, administrators and assigns, and successors and assigns, jointly and severally, firmly by these presents.

The conditions of the above obligation are such that, whereas, the Principal herein is herewith submitting to Whatcom PUD a certain BID PROPOSAL for, "*D Station Flow and Control Improvements*" attached hereto and hereby made a part hereof to enter into a Contract in writing.

NOW THEREFORE,

- a) If said BID PROPOSAL shall be rejected, or
- b) If said BID PROPOSAL shall be accepted and the principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing work or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extensions of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Signed and Sealed, this	day of, 2023.
Principal	Surety
Ву:	Ву:

(Seal of Surety)

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Washington.

* * * * * *

CONTRACT FORMS

<u>CONTRACT</u>

D STATION FLOW AND CONTROL IMPROVEMENTS

This Agreement, made and entered into this ______ day of _____, 2024, by and between the **Public Utility District No. 1 of Whatcom County**, Washington, hereinafter called the "Owner", and ______ of _____, Washington, hereinafter called the "Contractor", all in full compliance with the Contract Documents referred to herein.

WITNESSETH:

- 1. The Contractor, in consideration of the sum to be paid by the Owner and of the covenants and agreements herein contained, hereby agrees at its own proper cost and expense to do all the work and furnish all the materials, tools, labor, taxes, fees, and all appliances, machinery, and appurtenances for successful completion of the PLANT 1 = HIGH HEAD PUMP 5 VFD for the Owner, to the extent of the Proposal made by the Contractor.
- 2. The Small Work Contracting Procedures, Bidding Requirements, including the signed copy of the Bid Proposal, the Contract Forms, Addenda, Conditions of the Contract, and the Supplementary Conditions, Specifications and Drawings, are hereby referred to and by reference made a part of this Agreement as fully and completely as if the same were fully set forth herein and are mutually cooperative therewith.
- 3. Administration of Arbitration: The Owner and the Contractor mutually agree the venue of any arbitration hearing shall be in Whatcom County and that any such hearing be conducted within Whatcom County. The Owner and the Contractor mutually agree to be bound by the decision of the arbitrator, and judgment upon the award rendered by the arbitrator may be entered in the Superior Court of Whatcom County. The decision of the arbitrator shall be in writing. The arbitrator shall use the Contract, including "General Conditions and General Requirements" as a basis for decisions.
- 4. The Owner hereby appoints and the Contractor hereby accepts **none appointed** -, as the Owner's representative for the purpose of administering the provisions of this Contract, including the Owner's right to receive and act on all reports and documents related to this Contract, to request and receive additional information from the Contractor, to assess the general performance of the Contractor under this Contract, to determine if the Contracted services are being performed in accordance with Federal, state or local laws, and to administer any other right granted to the Owner this Contract. The Owner expressly reserves the right to terminate this Contract as provided in the Contract documents, and also expressly reserves the right to commence civil action for the enforcement of this Contract.
- 5. This Contract contains terms and conditions agreed upon by the parties. The parties agree that there are no other understandings, oral or otherwise, regarding the subject matter of this Contract.

6. The Contractor agrees to comply with all applicable Federal, State, and Owner's. or D Station Flow and Control Improvements municipal standards for the licensing, certification, operation of facilities and programs, and accreditation and licensing of individuals.

- 7. The Contractor shall not assign or subcontract any portion of the work provided for under the terms of this Contract without obtaining prior written approval of the Owner.
- 8. All terms and conditions of this Contract shall apply to any approved subcontract or assignment related to this Contract.
- 9. This Contract has been and shall be construed as having been made and delivered within the State of Washington and it is mutually understood and agreed by each party hereto that this Contract shall be governed by the laws of the State of Washington, both as to interpretation and performance. Any action in law, suit and equity or judicial proceedings for the enforcement of this Contract, or any provisions thereof, shall be instituted and maintained in Whatcom Superior Court.
- 10. The failure of the Owner to insist upon strict performance of any of the covenants and agreements of this Contract or to exercise any option herein conferred in any one or more instances shall not be construed to be a waiver or relinquishment of any such, or any other covenants or agreements, but the same shall be and remain in full force and effect.
- 11. It is understood and agreed by the parties hereto that if any part of this agreement is determined to be illegal, the validity of the remaining portions shall be construed as if the agreement did not contain the particular illegal part.
- 12. No Change or addition to this Contract shall be valid or binding upon either party unless such change or addition shall be writing, executed by both parties.
- 13. The Owner shall pay Contractor for completion of all work in each task, subject to additions and deletions as agreed upon and as provided in the Contract Documents.
- 14. The Contractor agrees to complete the work for each task within the time agreed upon and to accept as full payment hereunder the amounts computed as determined by the Contract Documents and based on the said Proposal.
- 15. The Contractor agrees to remedy all defects appearing in the work or developing in the materials furnished and the workmanship performed under this Contract during the warranty period after the date of final acceptance of the work by the Owner, and further agrees to indemnify and save the Owner harmless from any costs encountered in remedying such defects.
- 16. It is agreed that each task in the Contract, based upon the Proposal, shall be completed within the number of consecutive calendar days from the date the Notice to Proceed is issued, as stipulated in the Proposal.
- 17. In the event that the Contractor should fail to complete the Contract activities of each task within the time limit or the extended time limit agreed upon, as more particularly set forth in the Contract Documents, liquidated damages shall be paid at the daily rates stipulated in the Proposal. Sundays and legal holidays shall be included in determining days in default.

18.

IN WITNESS WHEREOF:

OWNER:	P.U.D. No.	1 of Whatcom County
	Ву	Chris Heimgartner
	Title:	General Manager
CONTRACTOR:		·
	By:	
		Please Print Name
	Title:	
	* * * * * *	

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, That we

the Contractor named in the Contract hereinafter referred to as PRINCIPAL, and

a corporation duly organized and existing under and by virtue of the State of

hereinafter referred to as SURETY, and authorized to conduct a general surety in the State of Washington, are jointly and severally held and firmly bound unto **Public Utility District No. 1 of Whatcom County**, hereinafter referred to as OWNER in said Contract,

"D Station Flow and Control Improvements Project", located in Whatcom County, Washington, in the sum of:

(enter total bid amount)

lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, and each of our heirs, executors, assigns, administrators and successors jointly and severally, firmly by these presents for the terms of the bond or any extension thereto that may be granted by the OWNER per the conditions herein, and until released in writing by the OWNER according to the terms stated below.

WHEREAS, the above-named Principal agrees to complete the improvements as outlined

WHEREAS, the PRINCIPAL executed and entered into a certain Contract hereto attached with the OWNER, dated the _____ day of ____, 20__, for such work specified therein within the timeframe specified in the Contract with the Owner required to complete the Contract as referenced herein.

NOW, THEREFORE, the condition of this obligation is such that if the PRINCIPAL shall, promptly, well, truly and faithfully complete the work in the Contract and perform all of the provisions and fulfill all of the undertakings, covenants, terms, conditions and agreements of said Contract, including without limitation any alteration in or addition to the obligations of the PRINCIPAL during the period of the original Contract and any extensions thereof that may be granted by the OWNER, with or without notices to the SURETY; and during the life of any guaranty required under the Contract; and shall also well and truly perform and fulfill all of the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made; notice of which modifications to the SURETY being hereby waived, and assure all guarantees against defective workmanship and materials, including the guarantee period following the completion by the PRINCIPAL and final acceptance by the OWNER and comply with all covenants therein contained in the Specifications, Drawings and other Documents constituting a part of the Contract required to be performed by the PRINCIPAL, in the manner and within the times provided in the Contract, and shall fully indemnify and save harmless the OWNER from all costs and damage which it may suffer by reason or failure so to do, and shall fully reimburse and repay it all outlay and expenses which it may incur in making good any default, and reasonable counsel fees incurred in the prosecution of or defense of any action arising out of or in connection with any such default; and furthermore shall pay all laborers, mechanics, and subcontractors and material men, and all persons who shall supply such person or persons and such principal or subcontractors with provisions and supplies for the carrying on of such work, shall indemnify and save harmless OWNER from all costs and damage by reason of the Principal's default of failure to do so, and shall pay the State of Washington sales and use taxes, and amounts due said State pursuant to Titles 50 and 51 of the Revised Code of Washington then this obligation to be void, otherwise to remain in full force and effect, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the SURETY, for the value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the work to be performed thereunder, shall in any way affect its obligation on this bond, and it does hereby waive

notice of any such change, extension of time, alteration, or addition to the terms of the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

If said improvements are not completed as outlined above within one year (the original term) from the signing of this agreement or extension of up to one additional year thereof, granted in writing by the OWNER upon written request of Principal and Surety, then Upon written notice from the OWNER to the Surety, the total sum of the bond stated above shall forthwith be submitted to the OWNER and utilized to complete said improvements. All costs related to said collection shall be deducted from the secured amount prior to release of any residual monies. Following completion of the work by the OWNER necessary for proper performance under its requirements, the OWNER shall make an accounting of the expenditure of funds and provide that accounting, along with any unused funds, to the Surety.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their separate seals this ______ day of ______, 20__, the name and corporate seal of each corporate party hereto affixed, and these presents duly signed by its undersigned representatives pursuant to authority of its governing body.

	PRINCIPAL
	Attest: (If Corporation)
By:	
	Signature
	Print Name
Title:	
	SUDETV
By:	SURETI
	Signature
	Print Name
	By: Title: By:

Note: Date of bond must not be prior to the date of the Contract. If Principal is a partnership, all partners should execute the bond.

IMPORTANT: The SURETY named on this bond shall be one who is licensed to conduct business where the project is located, and named in the current list of Companies Holding Certificates of Authorities as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department.

All bonds signed by an agent must be accompanied by a certified copy of the authority to act for the SURETY at the time of the signing of this bond.

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That we

the Contractor named in the Contract hereinafter referred to as PRINCIPAL, and

a corporation duly organized and existing under and by virtue of the State of

hereinafter referred to as SURETY, and authorized to conduct a general surety business with the State of Washington are jointly and severally held and firmly bound unto **Public Utility District No. 1 of Whatcom County**, hereinafter referred to as OWNER in said Contract,

"D Station Flow and Control Improvements Project", Whatcom County, Washington, for the penal sum of:

(enter total bid amount)

lawful money of the United States, for the payment of which sum, well and truly to be made, to the OWNER, the PRINCIPAL and the SURETY we bind ourselves, and each of our heirs, executors, assigns, administrators and successors jointly and severally, firmly by these presents as follows:

WHEREAS, the PRINCIPAL executed and entered into a certain Contract hereto attached with the OWNER, dated the ______ day of ______, 20___, for such work with the OWNER required to complete the Contract as referenced herein, including payment of labor, materials and subcontractors.

NOW, THEREFORE, the condition of this obligation is such that if the PRINCIPAL shall at all times duly, promptly and faithfully perform all of the provisions and fulfill all of the undertakings, covenants, terms, conditions and agreements of said Contract and any alteration in or addition to the obligations of the PRINCIPAL during the period of the original Contract and any extensions thereof that may be granted by the OWNER, with or without notices to the SURETY; and during the life of any guaranty required under the Contract; and shall pay timely all laborers, mechanics, and subcontractors and material men, and all persons who shall supply such person or persons and such principal or subcontractors with provisions and supplies for the carrying on of such work, shall indemnify and save harmless OWNER from all costs and damage, including any interest, late fees or penalties incurred by reason of the Principal's default or failure to act, and any attorney's fees and costs incurred by the Owner and shall pay the State of Washington sales and use taxes, and amounts due said State pursuant to Titles 50 and 51 of the Revised Code of Washington then this obligation to be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the SURETY, for the value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the work to be performed there under, shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the above bonded parties have executed this instrument under their separate seals this ______ day of ______, 20__, the name and corporate seal of each corporate party hereto affixed, and these presents duly signed by its undersigned representatives pursuant to authority of its governing body.

PRINCIPAL Attest: (If Corporation) Corporate Seal: By: Mattest: Signature Print Name Attest: Title: SURETY By: Signature Signature Print Name Signature Attest: Title: Title: Signature Corporate Seal: Print Name Attest: Title:			
Corporate Seal: By:Signature			PRINCIPAL Attest: (If Corporation)
Attest: Title: Signature Print Name SURETY By: Signature Corporate Seal: Title:	Corporate Seal:	By:	<u> </u>
Attest: Title: Print Name Attest: Title: SURETY By: Signature Print Name Attest: Title:			Signature
Attest: Title: SURETY By: Corporate Seal: Attest: Title:			Print Name
SURETY By:	Attest:	Title:	
SURETY By:			
By:Signature Corporate Seal:Print Name Attest: Title:			SURETY
Corporate Seal: Print Name		By:	0' /
Corporate Seal: Print Name Attest: Title:			Signature
Attest: Title:	Corporate Seal:		Print Name
	Attest:	Title:	

Note: Date of bond must not be prior to the date of the Contract. If Principal is a partnership, all partners should execute the bond.

IMPORTANT: The SURETY named on this bond shall be one who is licensed to conduct business where the project is located, and named in the current list of Companies Holding Certificates of Authorities as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All bonds signed by an agent must be accompanied by a certified copy of the authority to act for the SURETY at the time of the signing of this bond.

SPECIFICATIONS AND CONDITIONS

SUPPLEMENTARY GENERAL CONDITIONS

The General Conditions of the contract shall be "Division I, General Requirements" of the Washington State Department of Transportation's *Standard Specifications for Road, Bridge and Municipal Construction, 2022,* except as modified herein.

The document is available online at the following website: http://www.wsdot.wa.gov/publications/manuals/fulltext/M41-10/Division1.pdf

Order of Precedence

Section 1-01	DEFINITIONS AND TERMS Definitions
Section 1-02 Section 1-02.2	BID PROCEDURES AND CONDITIONSPlans and Specifications
Section 1-04	SCOPE OF WORK
Section 1-04.1(1)	Bid Items Included in the Proposal
Section 1-05	CONTROL OF WORK
Section 1-05.0	General
Section 1-05.10	Guarantees
Section 1-05.12(1)	First Anniversary Inspection
Section 1-07	LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC
Section 1-07.1	Laws to be Observed
Section 1-07.1(1)	Owner Safe Access
Section 1-07.6	Permits and Licenses
Section 1-07.9(5)	Required Documents
Section 1-07.18	Public Liability and Property Damage Insurance
Section 1-07.26	Personal Liability of Public Officers
Section 1-08	PROSECUTION AND PROGRESS
Section 1-08.5	Time for Completion
Section 1-08.9	Liquidated Damages
Section 1.08.10(2)	Termination for Public Convenience
Section 1-09 Section 1-09.4 Section 1-09.6 Section 1-09.13(3)A Section 1-09.13(3)B Section 1-09.13(4) Section 1-09.14	MEASUREMENT AND PAYMENT Equitable Adjustment Force Account Administration of Arbitration Procedures to Pursue Arbitration Claims in Excess of \$250,000 Claims Against Contractor's Retainage and/or Public Contract Bond
Section 1-10	TEMPORARY TRAFFIC CONTROL
Section 1-10.2(2)	Traffic Control Plans
Section 1-10.5	Payment

ORDER OF PRECEDENCE:

The order of precedence of the Conditions of the Contract is as listed as below: (The first is the highest precedence and last is the lowest)

- 1. Addenda
- 2. Contract Documents
- 3. All Documents and Forms Included in the Bid Proposal
- 4. Technical Specifications/ Special Provisions
- 5. Contract Plans and/or Drawings
- 6. Supplementary General Conditions
- 7. Division 1 General Requirements
- 8. Geotechnical Data Reports
- 9. Owner-Obtained Permits

Section 1-01 DEFINITIONS AND TERMS

Section 1-01.3 Definitions:

Is supplemented by adding the following:

Whenever these words are used in the Contract Documents, they shall have the following meanings:

"COMMISSION": Redefined to mean the three elected Commissioners of the Public Utility District No. 1 of Whatcom County; substitute for "Commission" and "Washington State Transportation Commission" whenever cited.

"CONTRACTING AGENCY", "DISTRICT" or "OWNER": Public Utility District No. 1 of Whatcom County, Washington; is to be substituted for "State," "Department," and "Department of Transportation" whenever cited.

"GENERAL MANAGER": The person appointed by the Commission per RCW 54.16.100 as the chief administrative officer of the District, substitute for "Secretary" and "Secretary of Transportation" whenever cited.

"ENGINEER": Public Utility District No. 1 of Whatcom County and its sub-consultants.

"STANDARD PLANS": Redefined to refer to the Standard Detail Sheets included with the Plans and Specifications as well as the WSDOT Standard Plans, current editions. The requirements of the Standard Detail Sheets shall be controlling in the case of any discrepancy between the Standard Details and the Standard Plans.

Section 1-02 BID PROCEDURES AND CONDITIONS

Section 1-02.2 Plans and Specifications:

Delete the existing Section and replace with the following:

"The Contracting Agency" will place review copies of the project plans and specifications on file in the office of:

Public Utility District No. 1 of Whatcom County (District) 1705 Trigg Road Ferndale, Washington 98248

Copies may be reviewed at these offices during normal business hours.

Prospective Bidders may purchase project plans and specifications from the District for the fee indicated in the Invitation for Proposals.

After Award of the Contract up to 5 sets of project plans and specifications will be issued without charge. Additional plans and specifications, if required, may be purchased from the District.

Section 1-05 CONTROL OF WORK

Add the following new section:

Section 1-05.0 General

Where the Specifications, the Owner's instructions, laws, ordinances, or any government authority require any work to be specially tested, or inspected, the Contractor shall give the Owner timely notice that such test of completed work is ready for inspection. If the inspection is by another authority than the Owner, the Contractor shall give the Owner timely notice of the date fixed for such inspection. Required certificates of inspection from authority(ies) other than the Owner shall be secured by the Contractor.

Section 1-05.10 Guarantees

Delete the existing Section and replace with the following:

Section 1-05.10 Guarantees

The Contractor shall furnish to the Contracting Agency any guarantee or warranty furnished as a normal trade practice in connection with the purchase of any equipment, materials, or items used in the completion of work in this public work contract.

When corrections of defects are made, the Contractor shall be responsible for correcting all defects in workmanship and/or materials in the Work completed under this service contract at any time during the contract period. The Contractor shall commence remedying such defects within five (5) calendar days of receipt of notice of discovery thereof from the Owner and shall complete such Work within a reasonable time. In emergencies, where damage may result from delay or where loss of service may result, such corrections may be made by the Owner, in which case the cost shall be borne by the Contractor. In the event the Contractor does not complete corrections within a reasonable time, the Work shall be otherwise accomplished and the cost of same shall be paid by the Contractor.

The Contractor shall be liable for any costs, losses, expenses, or damages, including consequential damages, suffered by the Owner resulting from defects in the Contractor's Work including but not limited to costs, labor, materials, equipment and administration incurred by Owner in making emergency repairs of such defective Work and associated costs of construction, inspection, and supervision by the Owner. The Contractor shall defend, indemnify and hold the Owner harmless from any and all claims which may be made against the Owner as a result of Contractor's defective Work.

Add the following new section:

Section 1-05.12(1) First Anniversary Inspection

The Owner and the Contractor shall mutually inspect the completed project prior to the expiration of the one (1) year warranty period. The Contractor shall, within thirty (30) calendar days of the inspection, repair at no cost to the Owner any and all defects noted at this inspection that are not due to abuse or negligence by the Owner.

Section 1-07 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Section 1-07.1 Laws To Be Observed:

Is supplemented by adding the following:

Section 1-07.1(1) Owner Safe Access

The Contractor shall provide safe access for the Owner and its inspectors to adequately inspect the quality of work and the conformance with Contract Documents.

Section 1-07.6 Permits and Licenses

Is supplemented by adding the following:

"The Contractor shall comply with all requirements of all permits provided by the Owner for this project." Ownership/responsibility of transporting, loading, unloading, delivering and obtaining required permits for this work shall be the responsibility of the Contractor.

Contractor shall provide proof of proper permits and/or location of disposal site to the District.

Section 1-07.18 Public Liability and Property Damage Insurance

Coverages and Limits

This complete section is revised from that in the Standard Specification to the following limits and applicable sections for this project. The below information does not prevent the Contractor from full compliance of this or other related insurance specifications and/or requirements as required by other local or state agencies.

1. Commercial General Liability

\$1,000,000. General Aggregate

\$1,000,000. Each Occurance

Or as amended by the Limits of Coverage Identified in the Permits included in the Appendix of the Specification

Bodily Injury and Property Damage -

5 5 5	
\$1,000,000.	General Aggregate
\$1,000,000.	Products & Completed Operations Aggregate
\$1,000,000.	Personal & Advertising Injury
\$1,000,000.	Each Occurance
\$50,000.	Fire Damage

Stop Gap Employers Liability

\$1.000.000.	Each Accident
\$1,000,000.	Disease – Policy Limit
\$1,000,000.	Disease – Each Employee

2. Commercial Automobile Liability

Bodily Injury and Property Damage – \$1,000,000. Combined Single Limit

3. Workers Compensation

As required by the Industrial Insurance Laws of the State of Washington.

The policy of insurance shall specifically name the Contracting Agency and any other entity specifically required by the Contract Provisions as an additional insured. The Contracting Agency shall be given forty five (45) calendar days prior written notice of any cancellation, reduction or modification of the insurance.

The following shall be named as additionally insured for this Project:

"Public Utility District No. 1 of Whatcom County"

Section 1-07.26 Personal Liability of Public Officers

Revise as follows:

"Neither the Owner nor any elected official, officer, or its employees shall be personally liable for any acts, nor failure to act in connection with the Contract, it being understood that in such manners; they are acting solely as agents of the Owner. No right of action shall accrue upon or by reason of this Contract to or for the use or benefit of anyone other than the parties to this Contract. The parties to this Contract are the Contractor and the Owner."

Section 1-08 PROSECUTION AND PROGRESS

Section 1-08.5 Time for Completion

Is supplemented by adding the following:

"Contractor shall complete all Work associated with the BID no later than Novermber15th, 2024, upon the issuance and acceptance of the Notice to Proceed."

Section 1-08.9 Liquidated Damages

Replace numbered paragraphs 1 and 2 with the following:

"1. To pay liquidated damages for each calendar day beyond the number of days or deadline/date established for substantial completion, assessed at a rate specified in the Bid Proposal and to authorize the Owner to deduct these liquidated damages from any money due or coming due to the Contractor."

Section 1-08.10(2) Termination for Public Convenience

Revise as follows:

Substitute "Resolution" for "Executive Order", substitute "Commission" for "President", and delete "or Governor of the State".

Section 1-09 MEASUREMENT AND PAYMENT

Section 1-09.4 Equitable Adjustment

Is supplemented by adding the following:

"All bilateral agreements shall constitute a full accord and satisfaction and represent payment in full as to adjustments in both Contract price and time of completion for all costs, whether direct or indirect, arising out of, or incidental to, or otherwise attributable to, the changed work including any and all delays and impacts resulting from the change to the Contract. Acceptance of payment by Contractor pursuant to such bilateral agreement shall constitute a waiver of any and all claims, known or unknown, arising out of, or incidental to, or otherwise attributable to the changed work."

Section 1-09.6 Force Account

Revise Item No. 1 (Labor) as follows: Substitute "15 Percent" for "29 percent." Revise Item No. 2 (Materials) as follows: Substitute "15 Percent" for "21 percent." Revise Item No. 3 (Equipment) as follows: Substitute "10 Percent" for "21 percent." Revise Item No. 4 (Services) as follows: Substitute "10 Percent" for "21 percent." Revise Item No. 6 (Contractor Mark Up of Subcontractor Work) as follows: Substitute "05 Percent" for "12, 10 & 7 percent."

Sections 1-09.13(3)A Administration of Arbitration

Sections 1-09.13(3)B Procedures to Pursue Arbitration

Sections 1-09.13(4) Claims in Excess of \$250,000

Delete the existing Sections and replace with the following:

- (1) <u>Disputes</u>: Claims, disputes or other matters in question (collectively referred to hereinafter as "Claim(s)") between the parties to this Contract arising out of or relating to this Contract or breach thereof shall be subject to the Dispute Resolution Procedures set forth in this Section.
- (2) <u>Notice of Claims</u>: Any Party having Claim(s) subject to these Dispute Resolution Procedures shall give notice of such claim(s) in accordance with Section 1-04.5, Procedure and Protest by the Contractor, of the Standard Specifications.
- (3) <u>Good Faith Negotiations</u>: Within twenty (20) calendar days after Contractor has submitted full supporting detail and documentation for Owner's review preceded by notification of Claim(s) in writing pursuant to Paragraph 2 hereof, representatives of the Owner and Contractor shall meet and endeavor to negotiate a resolution. Representatives of both Parties shall attend with authority to settle Claim(s) on their Party's behalf.
- (4) <u>Arbitration of Disputes</u>: If good faith negotiations fail to resolve Claim(s) arising out of or relating to this Contract or breach thereof, said Claim(s) shall be subject to and decided by arbitration in accordance with the provisions of the Revised Code of Washington, Chapter 7.04.
- (5) <u>Number of Arbitrators</u>: The arbitration of Claim(s) subject to these Dispute Resolution Procedures shall take place before a single mutually acceptable Arbitrator if the aggregate value of Claim(s) and Counterclaim(s) is less than \$250,000, exclusive of costs and attorneys fees. For Claim(s) and Counterclaim(s) having an aggregate value of \$250,000 or more, the arbitration shall take place before a panel of three (3) mutually acceptable Arbitrators, one of whom shall be designated as the Chairman and shall be a lawyer with at least ten years of experience in construction law. If the parties are unable to agree on Arbitrator(s), then the Arbitrator(s) shall be selected by Judicial Dispute Resolution of Seattle, Washington from a list of five (5) Arbitrators proposed by each party.
- (6) <u>Demand for Arbitration</u>: Demand for Arbitration shall be filed in writing with the other Party to this Contract. Demand for Arbitration shall be made within a reasonable time after Claim(s) has arisen but, in no event, prior to good faith negotiations pursuant to Paragraph 3 hereof. In no event shall any Demand for Arbitration be made after the date when institution of legal or equitable proceedings based on such Claim(s), would be barred by the applicable statues of limitations or repose.
- (7) Exchange of Information/Discovery: Following the filing of a Demand for Arbitration, the parties shall cooperate in the exchange of information relating to Claim(s) in arbitration. The parties shall freely exchange documents relevant to Claim(s) and depositions shall be limited to those reasonably necessary for each party to prepare for, or defend against, such Claim(s). Disputes regarding discovery shall be resolved by the Arbitrator or, where there is an arbitration panel of three Arbitrators, by the Chairman of the arbitration panel.
- (8) <u>Mediation</u>: Mediation shall be an express condition precedent to the hearing of any arbitration demanded under this Section. Mediation shall be conducted by a Mediator mutually acceptable to the parties involved in the dispute(s). If the parties cannot agree upon a Mediator, then the Mediator shall be selected by Judicial Dispute Resolution

of Seattle, Washington from lists of three (3) Mediators experienced in construction contract issues, disputes, and law, proposed by each party. The costs of mediation, including the mediator's fees, shall be shared equally by the Owner and Contractor. Such mediation shall take place not more than thirty (30) calendar days prior to the date scheduled for any arbitration hearing. Representatives of all parties involved in Claim(s) shall attend the mediation and each party representative shall have full, unrestricted authority to enter into a binding settlement agreement on behalf of that Party. The mediation proceedings shall be confidential and privileged.

- (9) <u>Attorneys' Fees & Costs of Arbitration</u>: In the event that arbitration and/or litigation is instituted to enforce or contest the provisions of this Contract or adjudicate any Claim(s) arising under this Contract, the prevailing party shall be entitled to its actual attorneys' fees and all costs incurred in connection therewith (including, without limitation, consultant and expert witness fees and expenses), in addition to costs otherwise taxable by Statute or Court Rule, in addition to any other relief granted. In addition to the powers of the Arbitrator(s) set forth in RCW Chapter 7.04, the Arbitrator(s) shall have the power to award attorneys' fees and costs pursuant to this Section.
- (10) <u>Consolidation & Joinder</u>: Any arbitration demanded under this Section may include, at the option of the Owner, by consolidation, joinder or in any other manner, an additional person or entity who is, or may be, involved in Claim(s) including, but not limited to, the general contractor's subcontractors and/or suppliers, and the Owner's subconsultants. In order to effectuate the purposes of this Section, Contractor shall ensure that its agreements with its subcontractors and suppliers shall incorporate in full, by reference, all of the provisions of this Section relating to Dispute Resolution Procedures.

Section 1-09.14 Claims Against Contractor's Retainage and/or Public Contract Bond

The Contractor shall be liable for all costs incurred by the Owner, including, but not limited to, legal fees, salary/wage costs of Owner's employees and litigation costs (whether or not recoverable by statute or court rule) arising out of claims against the retainage or the Contractor's Public Contract Bond. Owner may deduct any such costs from funds otherwise due the Contractor, including the retention, by unilateral Change Order.

* * * * *

APPENDICES

APPENDIX B

Specifications
Public Utility District No. 1 of Whatcom County

TECHNICAL SPECIFICATIONS FOR:

D Station – Flow and Control Improvements

Project No. WPUD 21.0163.00.0001

Spring 2023

PUD No. 1 of Whatcom County	RH2 Engineering, Inc
1705 Trigg Road	Pacific Meridian Plaza
Ferndale, WA 98248	4164 Meridian Street, Suite 302
	Bellingham, WA 98226
Phone: 360-384-4288	Phone: 360-684-1556
Contact: Garrett Love-Smith	Contact: Orin Paul, PE
	Email: opaul@rh2.com

Public Utility District No. 1 of Whatcom County

TECHNICAL SPECIFICATIONS FOR:

D Station – Flow and Control Improvements

Project No. WPUD 21.0163.00.0001

Spring 2023

THE CONTENT OF THIS DOCUMENT, AS A MEANS OF PROFESSIONAL SERVICE, IS PROTECTED BY 17 U.S.C. § 101, ET SEQ. AS SUCH, IT SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT OR PURPOSE WITHOUT WRITTEN AUTHORIZATION FROM RH2 ENGINEERING. © 2023 RH2 ENGINEERING, INC.



Orin Paul, PE Project Manager Divisions 1-15, and 18

Signed: 03/30/2023



Dan Burwell, PE Project Engineer Divisions 1-15, and 18 Signed: 03/30/2023



Mark Braaksma, PE Electrical Engineer Divisions 16 and 17

Signed: 03/30/2023

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Appendix A – Inadvertent Discovery Plan BP D Station

1.10 GENERAL

Sections in these specifications titled "Common Work for . . ." shall apply to all following subsections whether directly referenced or not.

Sections in these specifications titled "*Related Sections*" shall be read as integral to the specification as if they were fully detailed within. All work and materials described in such sections shall be provided and performed by the Contractor.

1.10.16 Definitions

[CSI 01 42 16]

Approximate: Generally as shown or described, but has not been verified, or may require adjustment. No level of accuracy is implied or should be assumed.

Or Equal (Or Approved Equal): An alternate product, assembly, or method that the Owner's Representative has reviewed based on information provided by the Contractor and determined to provide functional equivalence, or better, than that specified. Such determination does not relieve the Contractor's from responsibility should the product, process, or method fail to perform as needed.

Owner's Representative: Person(s) authorized by the Owner to observe the work, administer the contract, approve tests, make decisions, and otherwise act as an agent of the Owner. The terms Engineer, Owner's Observer, Owner's Inspector, and Owner are generally interchangeable with the term Owner's Representative.

Proposed: The word refers to work that is part of the Contract, to be performed by the Contractor. The word "proposed" does not need to show up to indicate work by the Contractor. Unless work is specifically noted to be performed by others, all work is to be performed by the Contractor.

1.11.00 Summary of Work

[CSI 01 11 00]

The D Station Improvements project consists of the construction of a parallel main, replacement water meter, future piping connections and the replacement of the throttling valve and actuator to control flow to British Petroleum remotely.

1.11.02 Reuse of Documents

[CSI 01 11 30]

Contractor and any Subcontractor or Supplier shall not:

1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

- 2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- 3. The prohibitions of this Paragraph will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

1.11.03 Electronic Data

[CSI 01 31 26]

- 1. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner to Contractor, or by Contractor to Owner, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- 2. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 30 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 30-day acceptance period will be corrected by the transferring party.
- 3. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.
- 4. Computer Aided Design (CAD) files may be made available to the Contractor upon request, but only at the discretion of the Engineer. This includes AutoCADTM, Civil3DTM, or other similar file types. If CAD files are provided, no level of accuracy is implied or should be assumed unless the Engineer expressly states a level of accuracy. CAD files by nature include extraneous information used to develop the drawings but are not part of the final design. Any use of CAD files is solely at the Contractor's risk and neither the Engineer nor the Owner take responsibility for interpretations by the Contractor, missing information, or inaccurate information.

1.13 Permits and Licenses

[CSI 01 41 26]

The Owner will secure and pay for the following permits:

- Permits currently complete:
 - Land Disturbance Permit with Whatcom County

The Contractor shall acquire and pay for all other necessary permits which may include:

• Electrical Permit

A copy of permits the Owner has acquired are available at the Owner's office for examination by bidders. Conform to the requirements of these permits and all other permits issued for this project. Permits the Owner will acquire after the bid opening will be made available when received by the Owner.

1.14 Work Restrictions

[CSI 01 14 00]

1.14.19 Use of Site

[CSI 01 14 19]

The Contractor shall not perform work activities, store materials or equipment, move equipment through, or disturb in any way the areas outside the "D-Station Property Limits" indicated as Parcel 'A' and Parcel 'B' on the plans shown unless approved by the Owner in writing.

D Station property limits may be occupied throughout the duration of the contract.

The Contractor shall provide, maintain and adjust erosion control fencing, surface covering, and sediment traps for storm-water runoff as shown on the plans prior to beginning any work activities within this area.

1.20 PRICE AND PAYMENT PROCEDURES

[CSI 01 20 00]

1.21.29 Quantity Allowances

[CSI 01 21 29]

If more or fewer materials are needed when the construction quantity is within plus or minus 25 percent of the bid quantity, costs for restocking of unused materials, or handling and delivery costs on additional materials shall be incidental to the bid price and no additional payment will be made.

1.21.55 Cost Increases for Materials

[CSI 01 21 55]

There will be no allowance for additional payment should the cost of any materials go up during the original contract timeframe, or during any approved contract time extensions. The Contractor is responsible for securing prices at the time of bid.

1.25.00 Substitution Procedures

[CSI 1 25 00]

Any product or construction method that does not meet these specifications will be considered a substitution. Substitutions must be approved prior to their installation or use on this project.

No guarantee is made that product model numbers included in the specifications or on the plans are current at the time of bidding. The bidder shall provide pricing in their proposal for current versions of discontinued models. If the bidder is uncertain of the correct replacement model, or feels there is a price discrepancy, the bidder shall request a substitution following the requirements of section 1.25.13.10 Substitutions Prior to Bid Opening. Requests for price increases after award will not be accepted.

1.25.13.10 Substitutions Prior to Bid Opening

[CSI 1 25 13 10]

Before opening bids, the Owner may consider written requests from product suppliers or prime bidders for substitutions. All requests for substitution must be received by Owner a minimum of 7 calendar days prior to bid opening. Requests shall be accompanied by drawings and specifications in sufficient detail to allow the Owner to determine if the substitute proposed is equal to that specified. All requests shall include a listing of any significant variations in material or methods from those specified. If there are no variations, a statement to that fact shall be included in the request for approval. The determination if a proposed substitute is acceptable shall rest solely with the Owner. Approval of substitutions will be only by addendum. The bidder shall include, in the proposal, all costs for any modifications required to adopt the substitute.

1.25.13.15 Substitutions After Contract Execution

[CSI 1 25 13 15]

Within 30 calendar days after the date of the contract, the Owner shall consider formal requests from the Contractor for a substitution of products in place of those specified. Submit two copies of each request for a substitution. Data shall include the necessary change in construction methods, including a detailed description of the proposed method and related drawings illustrating the methods. An itemized comparison of each proposed substitution with product or method specified shall be provided.

In making a request for a substitution, the Contractor represents that they have investigated the proposed product or method and has determined that it is equal or superior to the product specified. The Contractor shall coordinate the installation of accepted substitutions into the work, making changes that may be required for the work to be completed. The Contractor waives all claims for additional costs related to substitutions.

1.30 Administrative

[CSI 01 30 00]

1.31 Project Management and Coordination

[CSI 01 31 00]

1.31.01 Contractor's Responsibility

[CSI 01 31 01]

The work included in this contract is shown on the contract plans and described in these project specifications. All work incidental and necessary to the completion of the work described and shown shall be performed by the Contractor. In submitting a bid for this project, the Bidder warrants that they are an expert in this and related work, that they understand the process and functions shown, and that various work and processes not shown but necessary for the successful operation of this project will be provided by the Contractor.

The General (or Prime) Contractor is fully responsible for providing the subcontractors and suppliers with all relevant portions of the plans and specifications necessary to bid and construct the improvements.

Damage to existing utilities or property shall be repaired or replaced by the Contractor at the discretion of the Owner.

The Contractor and each of the Subcontractors are responsible for coordinating the required inspections. There are specific requirements for inspection responsibilities and the advance notice that must be given to minimize construction delays. It is the Contractor's responsibility to be familiar with these requirements, include the coordination necessary in this estimate of project costs and schedule, and to comply with the requirements during construction. Failure to follow proper inspection and notification procedures may result in on-site work stoppages and removal or demolition of unapproved structures or systems, all at the Contractor's expense. See Starting and Adjusting section for details.

Do not start work on this project or on any public or private right-of-way or easement until clearance is given by the Owner. It will be the responsibility of the Contractor to comply with the requirements of any permit for the project. Do not hinder private property access without a 24-hour notice to the private property owner, and do not hinder access for more than an 8-hour period. Do not disrupt emergency aid access to private property.

The Contractor is solely responsible for all elements of site safety. Inspections performed by the Owner are only to monitor and record that project plans and specifications are being complied with and construction is consistent with the design intent.

The Contractor is responsible for managing, coordinating, and overseeing its subcontractors, suppliers, manufacturers' representatives, or any other persons performing Work. The Contractor shall have a competent representative, familiar with the project and work being performed, on-site at all times.

1.31.10 COVID-19 Scheduling Provisions

<u>Exclusion from Force Majeure</u>. A force majeure event does not include the COVID-19 Pandemic. See Section 2, below, for information on how Contractor shall notify the Owner if Contractor desires to claim additional Time due to events attributable to the COVID-19 Pandemic.

<u>Waiver</u>. Contractor shall provide notice to the Owner of any delay attributable to the COVID-19 Pandemic in the manner specified in Section 2. Failure to provide notice to the Owner with regard to delays attributable to the COVID-19 Pandemic as required by Section 2 constitutes a waiver of Contractor's right to later make such a request.

Adjustment of Time for COVID-19.

- 1. Definitions.
 - a. "COVID-19" means the novel coronavirus respiratory disease.
 - b. "COVID-19 Pandemic" means the pandemic declared by the World Health Organization on March 11, 2020.
 - c. "Executive Order" means any order signed by a governor restricting or prohibiting certain activities of businesses, schools, and individuals to mitigate the spread of COVID-19.
 - d. "Labor shortage" means a shortage of Contractor's qualified personnel because they are on leave due to COVID-19.
 - e. "Governmental health regulation" means any state or local health regulation aimed to mitigate the spread of COVID-19, including the social distancing regulation.
 - f. "Supply chain disruption" means the Contractor's inability to obtain goods used to perform the Work contemplated under the Contract due to COVID-19.
 - g. "Time" means any term used to define the duration the Agreement is in effect, including, but not limited to "Term" or "Contract Time."
- 2. Contractor's Request Required. In the event the Contractor believes that additional Time is required due to the COVID-19 Pandemic due to delays resulting from a labor shortage, a supply chain disruption, or mandated compliance with Executive Orders or governmental health regulations, the Contractor shall submit to the Owner a timely request for adjustment of Time. A request is presumed to be timely if it occurs within seven calendar days after the Contractor becomes aware of any delay caused by a reason stated in this Section. The Owner will only consider requests for adjustment of Time if the Contractor's request provides the following information:
 - a. The date the delay began as a result of the COVID-19 Pandemic.
 - b. The cause of the delay. The Contractor must identify in the request whether the delay is due to a labor shortage, a supply chain disruption, or compliance with an Executive Order or governmental health regulation and the specific circumstances surrounding the delay.

- c. The specific actions and efforts the Contractor is doing to limit the impact of the delay.
- d. The date Contractor expects the delay will end, if known. If not known, Contractor shall promptly notify the Owner within seven calendar days after the delay ends.
- e. The Owner shall be entitled to request from the Contractor all documentation necessary to evaluate Contractor's request for more Time under this Section.
- 3. Basis for Adjustment of Time. The Owner will consider causes that include delays that affect the Contractor's performance of Work directly attributable to the COVID-19 Pandemic such as an Executive Order, a governmental health regulation, a labor shortage, or a supply chain disruption that could not be mitigated by the Contractor's specific actions and efforts, or by the reasonable actions and efforts the Contractor should have taken, to minimize the delay.
- 4. Consideration and Response by Owner. The Owner will only consider a Contractor's request for additional Time if Contractor supplied all the required information described in Section 3(b). The Owner will review a properly submitted request for Time adjustment related to COVID-19, and within a reasonable time, will advise the Contractor of the Owner's findings. If the findings determine that Contractor is entitled to additional Time, then Owner and Contractor shall execute a written change order extending the Time equal to the length of the actual delay in performance.

<u>Termination</u>. In addition to the termination rights in the Agreement, the Agreement may be terminated by either party by giving notice as required in the Agreement if: 1) federal or state laws, regulations, or guidelines are modified or interpreted in a way that the Work under the Agreement is prohibited; 2) recommendations, declarations or orders by state or local governments, including local health authorities and local officials, discourage or prohibit the event or scope of work that was to be performed under the Agreement; or 3) Owner is prohibited from paying for the work from the planned funding source.

1.31.19 Progress Meetings

[CSI 01 31 19 23]

The Contractor shall schedule and hold regular on-site progress meetings at least every two weeks and at other times as requested by the Owner or as required by progress of the work. The Contractor, Owner, and all Subcontractors active on the site must attend each meeting.

Contractor to provide an agenda covering the following items at a minimum, as applicable.

- 1. Review minutes of previous meetings.
- 2. Review of work progress.
- 3. Field observations, problems, and decisions.
- 4. Identification of problems that impede planned schedule.
- 5. Review of submittals schedule and status of submittals.
- 6. Review of off-site fabrication and delivery schedules.
- 7. Maintenance of progress schedule.

- 8. Corrective measures to regain projected schedules.
- 9. Planned progress during succeeding work period.
- 10. Coordination of projected progress.
- 11. Discussion of upcoming required inspections/approvals.
- 12. Maintenance of quality and work standards.
- 13. Effect of proposed changes on progress schedule and coordination.
- 14. Safety issues relating to work.
- 15. Other business relating to work.

1.32.13 Scheduling of Work

[CSI 01 32 13]

Refer also to the Completion Time section under the Instructions (or Information) to Bidders.

The Proposal describes the times for Substantial Completion and Physical Completion.

Where the plans or specifications mention notification periods in hours or days, these time periods are assumed to be working days unless specifically stated otherwise. For example, a requirement of 48-hours notification for work desired to be performed at 1:00 pm Monday requires notification be provided no later than 1:00 pm the preceding Thursday.

1.32.16 Construction Progress Schedule

[CSI 01 32 16]

Contractor is responsible for providing an up to date construction schedule with each monthly pay estimate and at other times as requested by the Owner or as required by progress of the work. If the current schedule is still in-line with the previous schedule, the Contractor shall inform the Owner with each pay estimate. Non-working day requests shall also be submitted by the Contractor with each monthly pay estimate. Owner may delay monthly progress payments if Contractor fails to submit updated schedule and non-working day requests.

1.32.29 Periodic Work Observation

[CSI 01 32 29]

The Owner may elect to have an observer on site to monitor, observe and record construction progress. The Contractor maintains complete responsibility to verify construction is meeting the design intent and is being constructed in accordance with the plans and specifications. It is not the responsibility of the Owner's observer to address neither means and methods issues nor direct safety issues. The Owner's observer does not have the authority to stop work if unsafe conditions are observed.

1.33 Submittals

[CSI 01 33 00]

1.33.23 Shop Drawings, Product Data, and Samples

[CSI 01 33 23]

Submittals may be provided in electronic format (preferred) or hard copy. Owner reserves the right to require the Contractor to provide hard-copy submittals at no additional cost to the Owner. When hard-copy submittals are provided, submit three (3) copies; one set will be returned to the Contractor after review. Hard copy of submittals will be addressed to:

RH2 Engineering, Inc. 4164 Meridian Street Suite 302 Bellingham, WA 98226 **ATTN**: Orin Paul **Email**: opaul@rh2.com

Electronic submittal via email is acceptable, however the Contractor shall follow up with the Owner to verify that the submittal was received. The Owner assumes no responsibility for emails that do not make it to the recipient. In the case of electronic submittals, only one copy will be returned to the Contractor, either electronically or hard copy at the Owner's discretion.

Submittal data shall contain sufficient information on each item to determine if it complies with the contract requirements. Submittal cutsheets and datasheets shall be annotated by the Contractor to clearly indicate the equipment and materials that will be provided, including any options or additive items. No generic cutsheets or datasheets will be accepted.

Items installed in the work that have not been approved through the submittal process shall be removed and an approved product shall be furnished, all at the Contractor's expense.

Shop drawing review will be limited to general design requirements only and shall not relieve the Contractor from responsibility for errors or omissions, or responsibility for consequences due to deviations from the contract documents. No changes may be made in any submittal after it has been reviewed except with written notice and approval from the Owner.

Shop drawings shall be submitted on 8¹/₂-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch sheets and shall contain the following information:

- Project Name as it appears on the Document Cover.
- Prime Contractor and Applicable Subcontractor.
- RH2 Engineering.
- Owner's Name (Public Utility District No. 1 of Whatcom County).
- Applicable Specification and Drawings Reference.
- A stamp or statement that the Contractor has checked the equipment for conformance with the contract requirements, coordination with other work on the job, and dimensional suitability.

• A place for the Engineer to respond.

Submittals that do not comply with these requirements may be returned to the Contractor for re-submittal. The Contractor shall revise and resubmit as necessary. Acceptable submittals will be reviewed as promptly as possible and transmitted to the Contractor not later than 13 calendar days after receipt by the Engineer. Delays caused by the need for re-submittal shall not be a basis for an extension of contract time or delay damages.

Shop drawings and submittals shall contain the following information:

- 1. Drawings, dimensions, and weights.
- 2. Catalog information.
- 3. Model number, including descriptions for option and accessory codes.
- 4. Manufacturer's specifications.
- 5. Special handling instructions.
- 6. Maintenance requirements.
- 7. Wiring and control diagrams.
- 8. List of contract exceptions.

By approving and submitting show drawings and samples, the Contractor warrants that they have determined and verified all field measurements, field construction criteria, materials, catalog numbers, and similar data, and have checked and coordinated each submittal with the requirements of the work and of the contract documents.

The Owner will pay the costs and provide review services for a first and second review of each submittal item. Additional reviews shall be paid by Contractor by withholding the appropriate amounts from each payment estimate.

The Contractor is responsible for identifying the shop drawings and submittals required for this project. Specific submittal requirements may be listed in each section of these specifications. Contractor shall keep a complete and up to date copy of all submittals and review responses at the job site readily available to the Owner for inspection.

1.40 QUALITY REQUIREMENTS

[CSI 01 40 00]

1.42.19 Reference Standards

[CSI 01 42 19]

Work under this contract shall be performed in accordance with applicable sections of the current Standard Specifications for Road, Bridge and Municipal Construction, Washington and Washington State Department of Transportation, hereafter referred to as the Standard Specifications.

Certain other referenced standards used in this specification are from the latest editions of:

• Whatcom County Code

- IBC International Building Code
- UPC Uniform Plumbing Code
- IMC International Mechanical Code
- IFC International Fire Code
- NEC National Electrical Code
- AWWA American Water Works Association
- ANSI American National Standards Institute
- ASA American Standards Association
- ASTM American Society for Testing and Materials
- WSEC Washington State Energy Code

1.43.20 Warranty

[CSI 01 43 20]

The Contractor shall warrant all work and products for a period of one (1) year following the warranty start date except for those components and listed warrantees below.

The warranty start date is the date the final payment (not retainage payment) is sent to the Contractor from the Owner.

The warranty start date is the date the Owner accepts the completed project by resolution.

Warranty does not cover damage due to misuse by the Owner or conditions outside of the Owner or Contractor's control or exceptional events (force majeure) including war, strikes, floods (water exceeding normal high water mark), rainfall in excess of 100 year storm event, fire, earthquakes, high winds (over 85 mph for 3 seconds peak gust), freezes below 10 degrees Fahrenheit (Western Washington), governmental restrictions, vandalism, utility power failures, or utility power surges (unless due to Contractor provided surge suppressor failure). The Contractor has control over workmanship, third party subcontractors and parts and materials used to complete the project.

1.45.16 Field Quality Control Procedures

[CSI 01 45 16]

Unless otherwise noted on the plans or within these specifications, provide 48-hour notice to the Owner and appropriate reviewing agency for all inspections required. 48-hour notice is defined as two complete working day notice. Time is not counted on weekends and holidays (inspections required on a Monday or the day after a holiday shall be scheduled a minimum of 48 hours in advance not including the holiday hours or weekend hours.)

Contractor shall schedule and arrange for the following inspections and tests with the appropriate reviewing agency and testing company.

- Special Inspections as required per IBC Division 17 and as noted on the drawings
- Any additional inspections required by Whatcom County, or other approval agency
- Soils and crushed rock compaction
- Pressure testing

1.50 TEMPORARY FACILITIES AND CONTROLS

[CSI 01 50 00]

1.51 Temporary Utilities

[CSI 01 51 00]

Provide all necessary water for construction-related fire protection and utilities required by this contract, or by laws and regulations. Sanitary facilities adequate for all workers shall comply with all codes and regulations.

At the close of this contract, the Contractor shall pay all utility bills that are outstanding, remove all temporary electrical, sanitary, gas, telephone and water facilities, and any other temporary service equipment that may remain. In addition, the Contractor shall arrange for the transfer of electrical and water accounts to the Owner's name.

Temporary electrical power is available at the site. The Contractor may use existing power facilities within D Station including 120V 20 A plug ins.

Temporary water is available at the site. The Contractor may use existing water from hosebib in D Station. Note this water is not potable.

1.52.00 Construction Facilities

[CSI 01 52 00]

Construct and locate all field offices, all necessary gates and barricades, fences, handrails, guard rails, and securities required by this contract, or by laws and regulations. Provide shelters and dry facilities for the workers as required. Provide all guards, marks, shields, protective clothing, rain gear, and other equipment required by law, ordinance, labor contracts, Occupational Safety and Health Administration (OSHA) regulations, and other regulations for the maintenance of health and safety. Provide first aid kits and equipment as required by law.

1.52.20 Locks and Keys

[CSI 01 52 20]

Contractor shall provide dedicated construction locks, or Owner's standard lock with removable construction core, for site and facility security during construction. Contractor shall provide Owner with two construction key(s) for all temporary locks. Owner may "double lock" any padlocks at their discretion.

The Owner will not provide Owner keys for the facility. The Contractor shall remove the existing key cores from D Station and replace with construction cores.

and daisy chain the gate

All devices requiring locks, including but not limited to access hatches, shall be configured to match Owner standard lock and keys. The Contractor shall provide and install the mortise cylinders. The Contractor shall provide the cores. The Owner uses a Best 1E series mortise cylinder and Best 7-pin interchangeable core.

Location	Туре
Exterior Door	Handle/Knob

If the Owner provides a key to the Contractor for existing Owner locks, the Contractor will be responsible for the key until returning it to the Owner. If the Contractor loses the key, the Contractor will pay for re-coring of all Owner locks that use that key.

1.54 Construction Aids

[CSI 01 54 00]

The Contractor or product manufacturer may include work, materials, or components to aid in shipping, storage, installation, or other work for their convenience. Such items shall be removed prior to final project acceptance if they may interfere with the operation or maintenance of permanent work. Some examples include, but are not limited to:

- Lifting eyes: Remove only if a safety concern, obstruction, or directed by Owner.
- Picking holes: Plug holes of buried and exterior items, or if safety concern.
- Intermediate or shipping bracing: Remove and dispose.
- Protective shipping adhesives, coatings, or covers: Remove and clean residue.

1.70 EXECUTION AND CLOSEOUT REQUIREMENTS

[CSI 01 70 00]

1.71 Examination and Preparation

[CSI 01 71 00]

1.71.23.16 Construction Surveying

[CSI 01 71 23 16]

The Contractor is responsible for surveying and staking and shall stake out the locations of the permanent easements, temporary easements, rights-of-way, and all major facilities shown on the Plans and establish bench marks at locations designated by the Owner. The Contractor shall protect all stakes and marks in their original conditions. If stakes and markings are destroyed or defaced before their use is ended, the cost of replacing them will be at the Contractor's expense. All stakes, points, and marks, shall be administered and approved by a registered professional land surveyor licensed in the State of Washington. Provide approved and stamped survey notes, and control points to the Owner for as-built purposes.

Replace all damaged survey monuments in accordance with WAC 332-120.

1.74 Cleaning and Waste Management

[CSI 01 74 00]

1.74.13 Progress Cleaning

[CSI 01 74 13]

All areas impacted by the work shall be restored to at least original condition, unless specifically identified otherwise in the plans or specifications. All costs are incidental.

If an area of the project will be left idle, or minimal work performed for more than two weeks, the Contractor shall clean up the area prior to moving. In this context, clean-up means: stockpiles and materials shall be removed so as not to be obstructions or hazards; surfaces graded smooth as to their purpose; traffic control systems removed, and traffic restored to the satisfaction of the local road agency.

1.74.23 Final Cleaning

[CSI 01 74 23

Clean up debris and unused material and remove from the site and any buildings. If vehicle traffic causes ruts, repair asphalt (new or existing) in paved areas. In non-traffic areas back track with dozer or excavator and repair to final surface condition including necessary hydroseed, mulch, and landscaping. Eliminate weeds within the construction area prior to project closeout.

Buildings shall be broom clean and all foreign damage or markings removed or repaired.

Equipment shall be washed clean using appropriate methods.

Unpainted exposed concrete structures shall be cleaned to a consistent bare concrete surface finish. Remove extraneous substances such as efflorescence, leakage residue, and excess repair materials.

Remove existing equipment or materials identified in the contract documents or that interfere with the work. Dispose of all such existing equipment or materials unless the Owner requests items to be salvaged for their use. Owner has first right of salvage.

Should the Owner identify salvageable items of their property prior to removal, the Contractor shall protect said items from damage during the work and will be responsible for reimbursing the Owner should the Contractor damage the items. In addition, remove the following items, intact and operational, and set aside for the Owner:

- Isolation valves
- Meter
- Telemetry panel

1.74.40 Abandonment & Removal of Terminated Water Facilities

[CSI 01 74 40]

Owner is the sole determiner of appropriate abandonment procedures and methods. Restore all disturbed surfaces to original condition or better and to the satisfaction of the Owner and land owner/agency. Deliver all removed facilities (fittings, valves, etc.) to the Owner at their office on Trigg Road in Ferndale at the discretion of the Owner. Dispose of equipment the Owner does not want. The following methods are approved abandonment procedures for terminated facilities.

Abandoned hydrants, services, branching mains, etc. shall be terminated at the facility location and at the mainline. The lateral pipe shall not be left connected to the mainline.

Valves:

- 1. Remove valves and valve boxes. Plug or blind flange the water main.
- 2. An alternative method of abandonment is acceptable if, at the discretion of the Owner, the valve cannot be removed. Plug and close the valve, then remove the valve box.

Watermains:

- 1. Cut and drain the abandoned water main where exposed during construction.
- 2. Remove mains in the way of new construction. Saw cut and remove short sections of pipe. Mains shall not be forcibly removed with heavy equipment due to potential damage to surrounding utilities.
- 3. Mains that will be terminated but not encountered during new trenching may be left in place, but all valves must be abandoned as described under "valves".
- 4. Plug ends of abandoned mains exposed during construction with grout plug, blind flange, or cap as directed by the Owner depending on the type of pipe and soil conditions.

1.75 Starting and Adjusting

[CSI 01 75 00]

1.75.16 Startup Procedures

[CSI 01 75 16]

1.75.16.10 Startup

[CSI 01 71 16 10]

See the Automatic Control section for control system startup.

Startup shall consist of a simulated operation of all equipment and controls. The purpose of startup shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set, and that the facility will function as an operating unit.

Startup shall not occur on a Saturday, Sunday, Monday, Friday, on an Owner recognized holiday, or the day before or after an Owner recognized holiday unless approved in advance by the Owner.

Technically qualified product representatives shall be present for the startup phase. All representatives shall be trained, qualified, and have experience in troubleshooting and fixing field issues. The startup shall continue until it is demonstrated that all functions, controls, and equipment are functioning correctly.

1.75.16.12 Startup and Testing Coordination

[CSI 01 75 16 12]

The Contractor shall conduct all testing and startup. Testing and startup shall not be a cause for claims for delay by the Contractor and all expenses for testing and startup shall be incidental to this contract.

The placing of all improvements in service shall consist of three parts: "testing", "startup", and "operation". Not less than 21 calendar days before the anticipated time for beginning testing, the Contractor shall notify and submit to the Owner for approval, a complete plan for the following:

- 1. Schedules for tests:
 - A. Telemetry Panel Factory Demonstration Test (at panel shop)
 - B. Control system
 - C. Meter calibration
 - D. Valve Actuation for throttling
- 2. Detailed schedule of procedures for startup.
- 3. Complete schedule of events to be accomplished during testing.
- 4. An outline of work remaining under the contract that will be carried out concurrently with the operation phases.

Failure to provide proper notification to the Owner may lead to liquidated damages if schedule cannot be maintained. If rescheduling is required because components are not ready for testing, the notification requirements are reset as needed to provide 21 calendar days advance notice to reserve the Owner Representatives' time.

The Contractor shall arrange for all materials, supplies, and labor necessary to efficiently complete the testing, startup, and operation. Measuring devices must be functional, accurate, legible, and scaled appropriately for the test. The Owner has the right to reject or require verification for any measuring device the Owner suspects in its accuracy.

At a minimum, the Contractor shall provide:

• Calibrated pressure gauge(s) (max scale of 120% to 200% of test pressure)

1.75.16.20 Testing

[CSI 01 75 16 20]

The Contractor may periodically request preliminary testing for items that must be covered or tested before other work can proceed. In these cases, do not cover up or test the work without timely notice to the Owner of its readiness for testing. Should any work be covered up without notice, approval, or consent, it must, if required by the Owner, be uncovered for examination at the Contractor's expense. All necessary equipment shall be set up and the work given a preliminary test so that defects may be discovered and repaired prior to calling out the Owner to witness the test.

Final testing consists of individual tests and checks made on equipment intended to provide proof of performance, operation, and control in the presence of the Owner. Assure proper alignment, size, condition, capability, strength, adjustment, lubrication, pressure, hydraulic test, leakage test, and all other tests deemed necessary by the Owner to determine that all materials and equipment are of specified quality, properly situated, anchored, and in all respects ready for use. Any certificates required in these specifications by the manufacturer's representatives shall be supplied to the Owner prior to startup.

All piping shall be tested as required by specifications and applicable codes. Tests on individual items of equipment shall be as necessary to show proper system operation. During testing, the Contractor shall correct any defective work discovered. Startup shall not begin until all tests required by these specifications have been completed and approved by the Owner.

Not less than five working days before the anticipated time for beginning the testing, the Contractor shall provide a list of representatives that will be attending the testing. The Owner may request additional representatives at no additional cost if said representatives are identified in these specifications.

Qualified product representatives are to be on site for startup and testing of specific pieces of equipment. Representatives required are listed in the relevant specification sections.

1.75.16.22 Scheduling of Owner Review for Testing

[CSI 01 75 16 22]

See Division 1.75.16.10 for scheduling and notification requirements.

The Contractor shall provide notification two working days and two working hours (to confirm readiness) of the scheduled test(s) to the Owner confirming that the Contractor has successfully completed all preliminary testing and that all equipment, tools, materials, labor, subcontractors, manufacturer's representatives, and all other items required for witnessed testing are available and fully functional. Failure to provide advance notification and confirmation or meet any of the testing requirements will constitute a failed test in accordance with the section Inspection and Tests of the General Conditions.

A detailed testing schedule shall be provided by the Contractor and updated as needed to be at least 48 hours ahead of actual testing. If testing requires downtime in order to perform repairs due to failed test, the Contractor shall pay the Owner in the amount of \$250 per hour per Owner Representative on site (minimum of \$500 per scheduled visit) for downtime lasting longer than 2-hours required to complete repairs to verify the complete construction is ready for startup and operation. This amount will be deducted from the appropriate bid item that relates to the finished construction and documented by the Owner at their discretion. The Contractor must have all systems pre-tested prior to calling the Owner for formal testing.

Schedule shall include control system testing starting on Mondays or Tuesdays so that the remainder of the week can be used to identify the stability of the control system for the SCADA system, pump station, or treatment plant. Control system testing shall not start on a Thursday, Friday, or the day before an Owner recognized holiday.

1.75.16.40 Electrical and Control Systems Testing

[CSI 01 75 16 40 or 25 08 00 or 26 08 00]

See also the applicable electrical sections for electrical system testing.

See also the applicable automation sections for automatic control system testing.

The following is a list of components that shall be tested prior to project completion. This list is intended as a general guide and is not necessarily complete:

- Valve throttling and actuation
- Meter calibration and verification

1.78 Closeout Submittals

[CSI 01 78 00]

1.78.23 Operation and Maintenance Data

[CSI 01 78 23]

Failure to provide acceptable final documentation including operation and maintenance (O&M) manuals and as-built drawings will result in non-payment of the appropriate bid item in the schedule of prices.

See also the Automatic Controls section for additional requirements for automatic control systems manuals. Detailed requirements for specific equipment and systems may also be included in their respective specification sections.

Remove and preserve all tags and instructions that come packaged with or attached to equipment. Deliver all such documents to the Owner bound in a three-ring binder or with the O&M Manual. Insert documents in sleeves if they cannot be punched. Scan all such documents to Adobe PDF format and provide with the O&M Manual.

Prior to the receipt of payment for more than 90 percent of the work, deliver to the Owner acceptable manufacturer's instructions covering equipment and systems O&M procedures, for coatings furnished under this contract, and any additional items indicated by the Owner.

The operating and maintenance instructions shall include, as a minimum, the following data for each coating and equipment item:

Products

- A. Identification including brand name, model number, and serial numbers.
- B. Date of manufacture and date of installation on job site.
- C. Complete as-built elementary wiring and one-line diagrams.
- D. Complete parts list, by generic title and identification number, complete with exploded views of each assembly.

Maintenance

- A. Recommended spare parts.
- B. Lubrication schedule including the applicable lubricant designation available from the Standard Oil Company of California.
- C. Recommended preventive maintenance procedures and schedules. Schedule shall be provided for daily, weekly, monthly, quarterly, semi-annually and annually maintenance.
- D. Disassembly and re-assembly instructions including parts identification and a complete parts breakdown for all equipment.
- E. Weights of individual components of each item of equipment weighing over 50 pounds.
- F. Name, location, and telephone number of the nearest suppliers and spare parts warehouses.
- G. All manufacturers' warranties. Include name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.
- H. Cleaning, repair, and maintenance instructions for each coating system.
- I. Provide USB flash drive or DVDs utilized in the manufacturer's instruction program.

Operation

- A. Recommended trouble-shooting and startup procedures.
- B. Recommended step-by-step operating procedures.
- C. Emergency operation modes, if applicable.
- D. Normal shutdown procedures.
- E. Long term shutdown (mothballing) procedures.
- F. Equipment specifications and guaranteed performance data.
- G. General manuals which describe several items not in the contract will not be accepted unless all references to irrelevant equipment are neatly eradicated or blocked out.

Provide 2 hard copies of O&M manuals (2 for Owner,). A duplicate USB or DVD copy shall also be provided but shall not substitute a hard copy unless approved by the Owner.

Bind each set of instructions into multiple volumes; each volume to be complete with an index and bound in a suitable, hard-covered binder. Binders shall be hardback construction with full-length metal hinge. 3-inch to 5-inch width as appropriate for the quantity of O&M documentation. More than one binder may be required for large projects. Binders equal to Wilson-Jones WLJ344 series or WLJ369 series or Specialty Loose Leaf models 87784, 98085, 98086, or 98984.

Manuals shall be assembled and indexed so that information on each coating and piece of equipment can be readily found.

The Contractor shall secure and deliver to the Owner all equipment warranties and other warranties and guarantees required for all equipment and processes. Delivery shall be done at one time covering all major and minor equipment warranties. Copies of the warranties shall be included in each O&M Manual.

See Division 1.43.20 for details regarding required warranties for specific components.

1.78.39 Project Record Documents

[CSI 01 78 39]

Prior to receiving final payment for the work, deliver a complete set of "As-Constructed" records (also called as-built, or record plans) to the Owner. The Owner has sole discretion to determine if the records provided are legibly and accurately presented and may request revisions, which shall be provided by the Contractor at no additional cost. Records shall be made as follows or as approved by the Owner:

- Yellow markings or highlights = deleted items
- Red markings = new or modified items

Records shall be provided in PDF format.

Provide "as-constructed" information on all items and work shown on the plans showing details of the finished product including dimensions, locations, outlines, changes, manufacturers, etc. The information must be in sufficient detail to allow the Owner's personnel to locate, maintain, and operate the finished product and its various components.

See also electrical plan requirements in Division 16.05.

1.79 Demonstration and Training

[CSI 01 79 00]

1.79.10 Training

[CSI 01 79 10]

See the Automatic Control section for automatic control systems training.

At the time that the facility is ready to be put into operation, the Contractor is to conduct an operation and maintenance training meeting with the Owner to explain in detail the operation and maintenance requirements of each of the facility's components. The training meeting shall not occur on the same days as a startup.

Operation of the facility shall commence immediately after completion of testing, startup, and training and after satisfactory repairs and adjustments have been made.

1.80 PERFORMANCE REQUIREMENTS

[CSI 01 80 00]

1.81.40 Pressure Ratings

[CSI 01 81 40]

Fittings, valves, pipe, and other fluid systems shall have pressure ratings equal to or greater than the pressures identified herein, unless specifically called out otherwise in the plans or specifications. Pressures listed are gauge pressure, unless specified otherwise.

The pressure class of pipelines and appurtenances shall comply with the Owner's standards for minimum pressure class or the pressure class that meets the requirements of this section, whichever is greater.

Equipment Type or Function	Working Pressure	Test Pressure
Upstream and including Throttling Valve	140 psi	200 psi
Downstream of Throttling Valve	25 psi	50 psi

Working Pressure: Manufacturer's rating of maximum pressure during extended operation.

Test Pressure: Maximum pressure during project specific testing.

1.81.45 Location Designations

[CSI 01 81 45]

The following location designations shall be used except where otherwise noted on the plans:

Dry Locations: Indoor continually dry areas including office, laboratory, blower, and electrical rooms.

Wet Locations: All locations exposed to the weather, whether under a roof or not, or within channels, basins or tanks.

Damp Locations: Process areas; areas containing pumps, valves, and major piping; all spaces wholly or partially underground, or having a wall or ceiling forming part of a channel or tank, unless otherwise designated on the Plans. Any areas which do not fall within the definitions for dry, wet, or corrosive shall be considered damp.

Corrosive Locations: Areas where chlorine gas under pressure, sulfuric acid, or liquid polymer are stored or processed, sewer wetwells and sewer manholes.

Immersed or **Submerged Locations:** Areas which are periodically, or continuously submerged in, or contain a liquid.

2.00 GENERAL

[CSI 32 00 00]

Sections in these specifications titled "Common Work for . . ." shall apply to all following subsections whether directly referenced or not.

2.05 Common Work for Exterior Improvements

[CSI 32 05 00]

This division covers the work for providing materials and performing all sitework as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Erosion and Sedimentation Control Plan
- Erosion Control Fence Fabric
- Dewatering Plan
- Shoring Plan and Calculations
- Structural Fill
- Pipe Bedding
- Trench Backfill
- Crushed Surfacing

Other items listed in this section or required by the Owner.

2.07 Geotechnical Investigations

[CSI 02 32 00]

No exploration of subsurface soil and groundwater conditions at the project site Was performed. Whatcom PUD has identified the area to have a high groundwater table during wet season October 1 to May 31st.

2.08 Special Inspections for Earth Work

[CSI 31 08 20]

Part 3 – Execution

Field Quality Control

Special inspections including visual, probing of subgrade, and compaction effort (nuclear densometer or probe) are required for the following locations:

- Trench backfill (visual, probe and nuclear densometer testing)
- Site area fill and native subgrade (visual, probe, and nuclear densometer testing if found necessary by the Owner)
- Crushed surfacing under vaults and parking areas (visual, probe, and nuclear densometer testing)
- Native (and fill if any) subgrade of vaults, footings, foundations, and floors (visual and probe)

Areas where fill (either native or non-native) is being placed shall be tested for compaction compliance by a special inspector. The Owner will pay for the initial testing. If tests indicate failure of compaction requirements, the Contractor shall pay for subsequent tests until tests indicate compliance with the specifications. Areas of native undisturbed subgrade shall be visually inspected by the Owner prior to placement of any material overtop. Contractor shall coordinate with the Owner a minimum of two (2) full working days prior to inspection being needed.

The Contractor shall fully cooperate with the special inspector, including providing safe access to the testing areas. No extra compensation will be provided for cooperation with and facilitation of inspections.

2.10 SITE PREPARATION

2.10.2 Clearing and Grubbing

[CSI 31 11 00]

Part 3 - Execution

Construction

Clearing and grubbing shall be performed by the Contractor to remove and dispose of unwanted debris, vegetative matter, and other items noted on the Plans within the construction limits and shall conform to Section 2-01 of the Standard Specifications.

Protect structures and foundations, utilities, fences, and all other existing improvements not being removed regardless if shown to be protected on the Plans.

Do not remove organic material including plants, grasses, trees, and native topsoil unless directed on the Plans. Where the Contractor is allowed to clear areas to facilitate construction but is not required to, restore any areas disturbed by construction to existing or better condition including matching surface restoration with seed, sod, or plantings as shown in adjacent areas required to be modified by the Plans. Restoration shall be completed at no additional cost to the Owner.

2.10.4 Dewatering

[CSI 31 23 19]

Part 1 - General

Submittals

The Contractor is to determine the scope, type, size, quantity, method of installation, operation, and removal of the dewatering system necessary to keep excavations de-watered to an elevation below the base of the excavation sufficient to stabilize the soils in the excavation and the surrounding areas, and to prevent flotation of partially completed structures. Prepare a detailed dewatering system plan and submit to the Owner for review prior to the installation of any dewatering system. This plan shall include, as a minimum, the scope, type, size, quantity, method of installation, operation, and removal of all dewatering systems.

Part 3 - Execution

Installation/Construction

Dewatering systems must be positioned away from all building and utility construction so as to not become a part of the permanent facility.

Furnish, install, and operate all necessary machinery, appliances, and equipment to meet these water control requirements. De-water and dispose of the water so as not to cause injury to property or a nuisance to the public. Maintain sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages, and have competent personnel available at all times to operate the equipment. The dewatering system shall not be shut down between shifts, on holidays, weekends, or during work stoppages.

Field Quality Control

The quality of all water discharged from the site shall meet all State and local requirements. Employ all means necessary to remove suspended solids, oils, trash, and other deleterious materials from water prior to discharging.

Control groundwater and surface water to prevent the softening of the bottom of excavations, or formation of quick conditions or boils during excavation. Lower ground water to 1 feet below the base of the excavation. The Owner will determine if soil conditions are unsuitable for supporting the improvements. The Contractor will determine soil conditions are unsuitable for performing work, placing materials, and proceeding with construction activities. When the dewatering system does not meet the specified requirements, and as a consequence there is a loosening or disturbance of the foundation soils, instability for the slopes, or damage to the foundation or structures occur, the Contractor shall at its own expense, supply all materials, labor, and equipment, and perform all work required for the restoration of foundation soil, slopes, or structure to the satisfaction of the Owner.

Restoration

Remove and backfill dewatering wells in accordance with applicable Federal and State regulations.

[CSI 01 55 13]

Part 1 - General

Summary

Provide temporary site access and maintain vehicular site access at all times. Access shall be of a quality to permit Contractor's forces and outside inspector's safe and convenient ingress/egress. Unless specifically provided for in other bid items, the cost of building and maintaining construction access shall be incidental with no separate payment.

2.11 Earthwork Materials

2.11.1 Common Work for Earthwork Materials

[CSI 31 05 00]

Part 1 - General

Acceptance at Site

Owner will review the site near the end of each pay period to determine the equivalent percentage of earthwork completed compared to the total earthwork lump sum price. Contractor will be paid based on the Owners judgement of percentage completed.

Part 2 - Products

Source Quality Control

All imported fill material shall be free of hydrocarbons (e.g. gasoline, diesel, oil, etc.), pesticides, herbicides, hazardous volatile organic compounds (VOCs) and synthetic organic chemicals (SOCs). Provide certification to the Owner that the fill is free of these chemicals.

2.11.3 Structural Fill

[CSI 31 23 23.52]

Part 1 – General

Summary

All fill placed below and against building components, building structures, vaults, manholes, handholes, slabs, sidewalks, and drives shall be "Structural Fill" unless other fill materials are specifically shown on the Plans. The structural fill material has been selected to support the weight of the structure in combination with the existing native material and to prevent adverse movement during an earthquake. Take particular care to maintain the integrity of the design by using structural fill where shown.

References

Where free draining material for structural fill is required as indicated on the Plans or needed to maintain compaction in adverse weather conditions, it shall conform with Section 9-03.14(1), "Gravel Borrow" of the Standard Specifications.

Structural fill for foundation subgrades, or where free drainage is not required through the structural fill shall conform with 9-03.14(2) "Select Borrow" of the Standard Specifications.

Part 2 – Products

Components

When structural fill will be used around pipes, 100-percent of the material shall pass a 1-inch sieve.

Structural fill shall be soil free of organics, debris, and other deleterious materials. The Owner will determine if native on-site materials are suitable for use as structural fill.

Part 3 – Execution

Installation/Construction

The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as structural fill. Structural fill shall bear on firm base and be placed in uniform layers not exceeding 12 inches in loose thickness. The backfill area must be free of standing water and the subgrade soils must be stable. Each layer of structural fill shall be compacted to at least 95 percent of its maximum dry density based on the ASTM D-1557 (modified) test procedure

2.11.4 Pipe Bedding

[CSI 31 23 23.53]

Part 1 – General

Summary

Fill placed below and around buried utilities. The bedding material has been selected to support the weight of the utility by distributing the load so that the completed utility and backfill system does not weigh more than the native material. The grain size has been selected so that the bedding will not migrate into the bottom of the trench. Take care to maintain the integrity of the utility design by using the appropriate pipe bedding material where shown.

References

Pipe bedding used around restrained joint pipe must be crushed surfacing and/or sand. Rounded gravels and pea gravel are not acceptable. Silty sands may be used with the Owner's approval but may require additional length of restrained joint pipe.

For ductile iron, steel, or concrete pipe larger than 4-inch diameter: Bedding material shall conform with Section 9-03.12(3) "Gravel Backfill for Pipe Zone Bedding" of the Standard Specifications except all shall pass a 3/4-inch sieve.

For PVC sewer and storm piping, CPEP regardless of diameter, conduit, service lines, and all other piping 4-inch in diameter or less: Bedding shall conform with Section 9-03.13 "Backfill for Sand Drains" or as approved by the Owner.

Part 3 – Execution

Installation/Construction

Bedding material shall surround the pipe and conduits to the limits shown on the Plans and provide uniform support along the entire length. Excavate bell holes to prevent concentrated loading at joints or bridging of the pipe. All bedding material shall bear on firm subgrade and be compacted to firm and unyielding condition.

2.11.5 Trench Backfill

[CSI 31 23 23.54 or 31 23 33]

Part 1 – General

Summary

All fill placed above the pipe bedding in a trench shall be "Trench Backfill". The trench backfill material has been selected to distribute surface loads over the utility. The grain size has been selected so that the trench backfill will not migrate into the pipe bedding or trench walls. Take particular care to maintain the integrity of the utility design by using the appropriate trench backfill material where shown.

References

Trench backfill shall consist of materials conforming to Section 9-03.19 "Bank Run Gravel for Trench Backfill" of the Standard Specifications or as approved by the Owner.

Part 3 – Execution

Installation/Construction

Trench backfill shall follow the requirements of WSDOT 7-09.3(10) and 7-09.3(11).

2.11.20 Geotextile Fabric

[CSI 31 32 19.16 or 31 34 19.16]

Part 1 – General

Delivery, Storage, and Handling

Ship, store, place, overlap, and secure fabric based on manufacturer requirements.

Part 2 – Products

Materials

Chose geotextile fabric to meet the requirements based on place and purpose of use.

Geotextile fabric called out on the Plans to separate drain rock or French drains from surrounding soils shall be equal to Tencate Mirafi 140N.
Geotextile fabric placed between quarry spalls and fill to separate soil fines shall be equal to Tencate Mirafi 160N.

Geotextile fabric called out to drain behind a wall without the use of drain rock shall be equal to Tencate Mirafi G100W.

Geotextile fabric for embankment stabilization shall be equal to Mirafi Miramat TM8.

Geotextile fabric placed below crushed rock in road subgrade shall be equal to

Tencate Mirafi 500X

Other locations may require a specialized geotextile fabric and if so shall either be identified in the Plans or geotechnical report.

2.20 EARTH MOVING

[CSI 31 20 00]

2.23 Excavation

[CSI 31 23 16]

Part 1 – General

Summary

Excavate as necessary to construct the improvements shown.

Part 2 – Products

Materials

Remove all excavated material from the project site unless approved as backfill by the Owner. Approval of material as backfill will be made the moment before placement of the material as backfill. Weather conditions may make previously excavated material unsuitable for backfill requiring the material to be removed from the project site.

Part 3 – Execution

Installation/Construction

Excavation includes the digging, scraping, and removing existing native material, abandoned or interfering utilities, abandoned or interfering structures, and any other obstacles necessary for the construction of the improvements. Excavation includes utility excavation, structural excavation, and grading excavation.

Perform utility excavation to the depths necessary to complete the utility work shown.

Perform structural excavation to the limits shown and established by the Owner. Extend the base of the excavation laterally a minimum of 2 feet beyond the structure unless specified otherwise on Plans.

Excavated material may be stockpiled on-site. Temporary stockpiling of excavated material will not be permitted outside the construction limits at any time.

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Examination

The Owner will evaluate the base of the excavation to determine if it is suitable for backfilling. The Owner will evaluate the stability of the base of excavation by determining if all significant organic soils or other unsuitable materials have been removed.

Construction

Perform excavation required by the Owner that is beyond the depth shown, per the direction of the Owner. The Contractor will be reimbursed for additional excavation by change order once agreed to by the Owner in writing.

2.25 Temporary Erosion and Sedimentation Control

[CSI 01 57 13]

2.25.3 Temporary Erosion and Sedimentation Control

[CSI 01 57 13.13]

Part 1 – General

Quality Assurance

The Temporary Erosion and Sedimentation Control (TESC) plans shown on the construction Plans are the minimum requirements for the anticipated site conditions. The Contractor shall add additional TESC facilities or processes as necessary to ensure that erosion and sedimentation problems do not occur. The Contractor shall inspect the TESC facilities daily and maintain the systems as necessary to prevent off-site damage.

Part 2 – Products

Materials

Straw or mulch shall be applied to exposed surfaces to minimize erosion and filter surface water runoff. Where straw or mulch is required for erosion control, apply to a minimum thickness of 2-inches. Straw shall not include Reed Canary grass.

Part 3 – Execution

Installation/Construction

All TESC systems including; fencing, earth berms, grasses, straw, mulch, culverts, drain pipe, outfalls, and other items required by for this project, must be installed prior to any clearing, grubbing, excavation, grading work, or other work that could result in off-site stormwater or material flows. TESC systems must remain in place throughout the duration of the construction activities. The systems may be relocated to complete construction activities if their location impedes the associated work. If the systems are relocated to complete any work, they must be reinstalled to protect the construction and surrounding areas prior to commencing work on other portions of the project.

Take care and diligence to minimize erosion exposure and provide TESC measures as shown on the Plans and required by construction practice. Install earth berms as necessary to prevent surface water migration into excavations or off the project site. Route surface water intercepted by earth berms to an approved stormwater conveyance system. Ensure that the concentration of surface water at the earth berm does not erode the adjoining or downstream properties. Remove sediment deposited against the earth berm so surface water can flow freely. Do not remove the earth berm before the stabilization of the surface downhill from the berm.

2.25.4 Temporary Storm Water Pollution Control

[CSI 01 57 23]

Part 3 – Execution

Field Quality Control

The Contractor shall be responsible for meeting all construction stormwater discharge water quality requirements including State of Washington (WAC 173-220-020), Construction Stormwater Permit requirements and local requirements regardless of weather conditions.

If the project is fined by the permitting authority, that fine shall be paid by the Contractor at no additional cost to the Owner.

2.50 EXCAVATION SUPPORT AND PROTECTION

[CSI 31 50 00]

2.51 Contractor Designed Shoring

[CSI 31 50 10]

Part 1 - General

Summary

Where shoring, sheet piling, sheeting, bracing, lagging, or other supports are necessary to prevent cave-ins or damage to existing structures, it is the responsibility of the Contractor to design, furnish, place, maintain, and remove supports in accordance with applicable laws, codes, and safety requirements.

References

Chapter 296-155 of WAC, "Safety Standards for Construction Work, Part N, Excavation, Trenching, and Shoring".

OSHA

Quality Assurance

Where the Contractor is required to provide the shoring design, it shall be prepared by a competent person as defined by WAC 296-155-650. Before beginning any excavation that is governed by the shoring requirements, the Contractor shall submit their stamped shoring plan and calculations to the Owner for approval. The stamp must be present on all Plans and calculations, and all submittals must be approved by the Owner prior to starting work.

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Part 3 - Execution

Installation/Construction

Design, planning, installation, and removal of sheeting, shoring, sheet piling, lagging, and bracing shall maintain the undisturbed state of soil below and adjacent to excavation.

2.60 CONTAMINATED & WASTE MATERIALS HANDLING

2.60.2 Waste Material Control

[CSI 01 74 19]

Part 1 – General

Quality Assurance

Adhere to all requirements of federal, state, and local statutes and regulations dealing with pollution. Permit no public nuisances.

Use only dump sites that are approved by the regulatory agency having jurisdiction, and present proof of approval upon request.

Part 3 – Execution

Installation/Construction

The Contractor shall take precautions to warn, protect, and prevent the public from all hazards that exist on site due to demolition or construction operations. Surround stockpiled debris with yellow warning tape attached to lath, stakes, poles, or fencing to warn the public of any potential hazard.

Use water sprinkling, temporary enclosures, or other methods to limit dust and dirt from rising and scattering in the air. Collect and clean surface water runoff that is contaminated with site debris, silt, or other material that adversely affects water quality prior to discharge. On-site collection ponds may not be used to keep silt laden water from entering the storm water collection system.

Do not use water to control dust when its use may create hazardous or objectionable conditions such as ice formation, flooding, or pollution.

Minimize the amount of dust and other airborne particles caused by any demolition, excavation, stockpiling, or removal activities. Implement dust control measures prior to the beginning of work activities. Exposed soil may be wetted with water or covered to minimize dust creation. Water runoff from the wetting procedure shall be accumulated and cleaned prior to disposal. Remove water runoff accumulation from the site prior to project completion.

Cleaning

Keep the construction area clean and orderly. Upon completion of the work, leave buildings broom clean and all parts of the work clean and free of rubbish and excess material of any kind. Leave fixtures, equipment, walls, and floors clean and free of stains, paint, roofing splashes, or other marks or defects. Upon completion, restore site and all work or equipment and material storage areas to their original conditions. Remove all miscellaneous unused material resulting from work and dispose of it in a manner satisfactory to the Owner. The site, through the progress of construction, shall be kept as clean as possible and in a neat condition.

2.61 Contaminated Materials

2.61.2 Toxic Spill or Release Contact Requirements

[CSI 02 61 40]

Part 3 - Execution

Field Quality Control

During construction, if there is any toxic substance spill or release discharged into the environment, report the location, quantity, date and time of the spill or release to Washington State Emergency Management at 1 (800) 258-5990 and the Owner's representative. Spills shall be monitored, contained, and cleaned up to applicable codes at the Contractor's expense.

2.61.3 Hazardous Lead Materials

[CSI 02 83 00 (facility) 02 61 13 (soils)]

Part 1 - General

Quality Assurance

The Owner is not aware of any hazardous lead containing materials on or in the project site. If the Contractor discovers hazardous lead materials, they shall notify the Owner as to where hazardous lead materials are located. Due to the OSHA Right to Know Laws, the Owner is required to notify the Contractor that hazardous lead materials exist or if not known but discovered, the Owner is required to mitigate the removal of the hazardous lead materials.

The Owner is not aware of any hazardous lead containing materials on or in the project site. If hazardous lead materials are discovered by the Contractor, the Owner will mitigate the removal of the hazardous material.

Part 3 - Execution

Installers

Follow all requirements and regulations for hazardous waste removal and disposal. The Contractor must meet the following qualifications to be eligible to be selected to perform lead removal and demolition or disposal work for this project:

- 1. Meet State and Local OSHA and WSHA requirements for lead abatement.
- 2. Meet State hazardous removal requirements (Washington Department of Ecology)
- 3. Not have received a citation from the Puget Sound Air Pollution Control Agency related to lead abatement within the last year.
- 4. Possess occurrence based liability insurance coverage.

2.61.26 Hazardous Asbestos Materials

[CSI 02 61 26 (soils) 02 82 00 (facility)]

Part 1 - General

Quality Assurance

If the Contractor discovers hazardous asbestos materials, they shall notify the Owner as to where hazardous asbestos materials are located. Due to the OSHA Right to Know Laws, the Owner is required to notify the Contractor that hazardous asbestos materials exist or if not known but discovered, the Owner is required to mitigate the removal of the hazardous asbestos materials. Abandon asbestos cement piping in place.

Site Conditions

Asbestos was found at the following locations during an onsite asbestos abatement analysis or via review of as-built records:

Steel pipe asbestos tar wrapped pipe downstream of D Station to the BP refinery.

Hazardous asbestos materials shall be removed and properly disposed of. The cost for this hazardous material removal made known to the Contractor as listed above shall be completed by the Contractor at their expense.

Follow all requirements and regulations for hazardous waste removal and disposal. The Contractor must meet the following qualifications to be eligible to be selected to perform asbestos demolition or disposal work for this project:

- Possess a Certified Asbestos Abatement Contractors' license or retain the services of a Certified Asbestos Abatement Contractor.
- Have performed Asbestos Abatement of a similar nature within the last year.
- Not have received a citation from the Puget Sound Air Pollution Control Agency related to asbestos abatement within the last year.
- Possess occurrence-based liability insurance coverage.

3.00 GENERAL

Sections in these specifications titled "*Common Work for* . . ." apply to all following subsections whether directly referenced or not.

3.05 Common Work for Concrete

[CSI 03 05 00]

Part 1 - General

This division covers that work necessary for furnishing and installing all concrete as described in these specifications and as shown on the Plans.

References

Materials shall conform to the following standards:

- Cement ASTM C150
- Coarse aggregate ASTM C33
- Fine aggregate ASTM C33
- Admixtures ASTM C494
- Air-entraining admixtures ASTM C260
- Fly Ash ASTM C618
- Admixture and products in contact with potable water NSF 61

Submittals

Submittal information shall be provided to the Owner for the following items:

- Concrete mix design including aggregate gradation and substantiating strength data.
- Admixture Data
- Special placement procedures for hot or cold weather
- Concrete anchors
- Concrete anchor installer certification per ACI/CRSI Adhesive Anchor Installer Certification Program.
- Rebar mill certifications
- Precast concrete items
- Grouts
- Embedded items
- Method of plugging through-bolt holes
- Injection Grouting information per Division 3.64

Concrete mix designs shall be submitted to the engineer for approval a minimum of two weeks prior to placing any concrete. The mix design shall include the amounts of cement, fine and coarse aggregate, water and admixtures, as well as the water cement ratio, slump, concrete yield, aggregate gradation, and substantiating strength data in accordance with ACI 318, Chapter 5. A batch plant inspection may be required, the cost of which shall be paid by the Contractor. Review of mix submittals by the engineer of record indicates only that information presented conforms generally with contract documents. Contractor or supplier maintains full responsibility for specified performance.

Part 2 - Products

Components

Nominal maximum size for aggregates is the smallest standard sieve opening through which the entire amount of aggregate is permitted to pass. Provide intermediate aggregate grades as required to achieve a well-graded mix.

All concrete surfaces exposed to weather or standing water shall be air entrained. Total air content shall be in accordance with IBC requirements unless specified otherwise herein. Air shall be measured at the truck, unless otherwise agreed to.

Water used in concrete shall be potable.

Fly ash may be substituted for up to 15 percent of the required cement, except where noted.

Any products that will be applied to the surface of the concrete and will be in contact with potable water must carry NSF 61 certification. Any concrete admixtures used in potable water storage structures must also carry NSF 61 certification.

Mixes

Concrete shall be mixed, conveyed, and proportioned in accordance with IBC section 1905.

The concrete mix shall include the amount of cement, fine and coarse aggregate, including aggregate gradations, water, and admixtures as well as water cement ratio, slump, concrete yield, and sustaining strength data in accordance with these specifications, the requirements of the International Building Code Section 1905, and the requirements of ACI 318.

Finishes

Coat all aluminum in contact with concrete as specified in Division 9.

Part 3 - Execution

Inspection

See Statement of Special Inspections on the Drawings for special inspection requirements. Provide two (2) full calendar day notice to Owner prior to needing the required inspections.

Also comply with local building department and permit requirements for inspection and notification.

The Contractor shall repair, replace or modify, as appropriate, any items noted in the Special Inspector's inspection or the building department inspection.

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Testing

Concrete strength tests shall be performed per section 1905.6 of the IBC and per the requirements noted herein. The Owner will provide and pay all costs of concrete testing. The Engineer shall be furnished with copies of all inspection reports and test results.

Cylinders used for concrete strength tests shall be 6 by 12. Four by 8 cylinders may be used for mixes with maximum aggregates less than 1-inch, however the testing lab must apply a 0.94 multiplier to the compressive strength test results unless data acceptable to the Engineer is presented that would justify a higher multiplier. All mixes utilizing aggregates over 1 inch shall be tested using 6 by 12 cylinders.

When 4 by 8 cylinders are utilized AASHTO T23 requirements shall be followed, and the retainer used with neoprene pads when testing for compressive strength shall be constructed according to ASTM C1231.

The Contractor will coordinate all concrete testing with the testing agency. Costs will be paid by the Owner.

Give the Owner and testing agency 48-hour notice prior to concrete placement. If Contractor fails to provide the required notice, the Owner may elect to cancel the affected concrete placement. Contractor shall be responsible for costs and delays due to improper notification.

If the Contractor schedules a concrete placement and does not notify the Owner and testing agency of a cancellation within 24 hours of the scheduled placement, the Contractor shall pay the testing agency costs for an unnecessary trip. If the Contractor fails to provide the testing agency with adequate notification and testing agency cannot attend concrete placement, Contractor shall reschedule placement. Contractor shall be responsible for all associated delays.

The Contractor shall provide all assistance and cooperation necessary to testing personnel to obtain the required concrete tests. Contractor and Owner will have access to testing results as soon as they are available.

The testing agency shall take a minimum of four samples for every 50 yards of concrete placed (and a minimum of four per pour); one for a 7-day test, two for 28-day tests, and one for backup testing in case the other two samples do not meet design strength. Additional samples may be taken to verify strength prior to form removal at the Contractor's expense.

3.06 Maintenance of Concrete

[CSI 03 01 00]

3.06.30.71 Resurfacing of Cast-in-Place Concrete

[CSI 03 01 30.61]

Part 1 - General

This division covers that work necessary for repairing spalled and damaged concrete. Repair any areas with deterioration exceeding ¹/₂-inch, where rebar is exposed or where directed by the Owner.

Part 2 - Products

Materials

CONCRETE REPAIR MATERIAL: SikaTop 111 PLUS or equal cement-based repair mortar. Mortar shall be ANSI/NSF Standard 61 approved if in contact with potable water and contain a corrosion inhibitor. See Manufacturer's Literature for primer and auxiliary products appropriate for use with the repair material.

SILANE SEALER shall be alcohol based, 95 percent silane. No fillers, sterates or paraffins are allowed. Use DUR A PELL 100 as manufactured by Chemprobe Coating Systems or equal.

Part 3 - Execution

Preparation

The Contractor shall be familiar with the product and methods and be prepared to discuss the repair procedure at the Preconstruction Meeting.

High pressure power-wash the exposed structure to remove all loose, delaminated concrete to sound concrete.

Surface Preparation: Remove loose, delaminated concrete to sound concrete. Where corrosion of the reinforcement exists, continue bulk removal along the reinforcing steel and adjacent areas with evidence of corrosion-induced damage Under-cut all exposed reinforcing steel by a minimum of ³/₄-inch. The shape of the prepared cavity should be square or rectangular in shape. The edges of the patches shall be saw-cut perpendicular to the surface to a minimum depth of ¹/₂-inch. Repair area shall be a minimum of ¹/₂-inch deep throughout. Use abrasive blasting to remove residual dust, debris, fractured concrete, and contaminants that prevent proper bonding. Following abrasive blasting, blow out repair areas with oil-free compressed air. The final surface texture should be rough with minimum ¹/₈-inch amplitude.

Treatment of exposed reinforcement: All signs of corrosion should be removed from exposed reinforcing steel by an abrasive blasting, wire wheel or needle scaler. If the cross-sectional area of the reinforcing steel has been significantly reduced, the engineer should be consulted. Prime reinforcing as recommended by the repair material manufacturer.

Installation

Surface Saturation: Saturate surface with potable water. The base concrete shall be in a saturated surface dry (SSD) condition prior to application of repair material to prevent a rapid loss of moisture from the repair material and into the substrate.

Mixing and Application of Repair Material: Mixing and application shall be in strict accordance with the manufacturer's instructions. Apply the material with adequate pressure before the bond coat dries. Thoroughly consolidate the repair material into the corners of the patch and around any exposed reinforcement in the repair zone. If a second lift is required, thoroughly roughen the surface of the first lift by scoring the soft mortar to achieve an aggressive finish, similar in profile to the prepared concrete substrate. If the second lift will not be immediately applied, keep the first lift moist until application of the second lift. Finish to match existing surface. Cure using curing compound.

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Apply silane sealer as specified to exposed surfaces and edges of roof slab.

3.10 FORMING AND ACCESSORIES

[CSI 03 10 00]

3.11 Formwork

[CSI 03 11 00]

3.11.13 Structural Cast in Place Forming

[CSI 03 11 13]

Part 1 – General

The Contractor shall submit a construction joint plan to the Engineer for review prior to formwork and rebar installation if altered from that shown on the Plans. Modifications to the construction joints shall be submitted to the Engineer no less than 7 calendar days prior to placing the forms and rebar.

Part 2 – Products

Materials

Unless otherwise directed, coat contact surface of forms with colorless, non-staining, mineral oil that is free from kerosene, or other approved suitable material, to permit satisfactory removal of forms without concrete damage. Form-release agent for interior of potable water storage structures shall be National Sanitation Foundation Standard (NSF) No. 61 approved for use in direct contact with potable water.

Form construction for surfaces covered with backfill shall be made of steel, plywood, or dressed, matched lumber. Form construction for exposed surfaces shall be made of new plywood or steel without surface markings.

Form ties for use in liquid containment structures shall be standard plastic cone snap-ties with ³/₄-inch diameter neoprene waterstop washer or removable taper ties. Use Greenstreak X-plugs with removable taper ties or equal. Contractor shall submit to the Engineer form ties to be used for review prior to installation.

Part 3 - Execution

Installation/Construction

Concrete forms shall be sufficiently tight to prevent leakage of concrete or mortar and shall be properly braced or tied together to maintain desired position and shape until removed.

Conduits, pipes and sleeves of any material not harmful to concrete and within the limitations of ACI 318, Section 6.3 are permitted to be embedded in concrete with approval of the Engineer. Provide a ³/₄-inch chamfer or radius at all exposed corners and edges, unless specifically stated otherwise on the Plans.

Forms shall remain in place until the concrete has developed sufficient strength to withstand imposed loads without damage or deflection. Wall and slab forms shall remain in place for a

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minimum of 24 hours after completion of the pour. Forms for beams and suspended slabs shall remain in place for a minimum of 14 days AND until concrete has developed 28-day design strength, unless approved by the Engineer. The Contractor shall coordinate with the testing lab to verify concrete strength prior to form removal.

Do not allow water to flow through areas where forms are to be placed. During form construction and prior to placement of concrete, keep footings and floor slab areas free of standing water.

Field Quality Control

Variations from plumb, specified grade, conspicuous lines, and walls shall not exceed plus or minus ¹/₄-inch in any 10-foot length, and shall not exceed one inch over the entire length. Variations from dimensions shall not exceed plus or minus ¹/₂-inch. Closer tolerances shall be achieved by the Contractor as necessary to accommodate equipment and other permanent materials.

3.15 Concrete Accessories

[CSI 03 15 00]

3.15.14 Bentonite Waterstop

[CSI 03 15 13.16]

Part 2 - Products

Materials

Bentonite Waterstop shall be Volclay WATERSTOP-RX 101, or equal. Use Bentonite Waterstop only where specifically called out on the Plans. Bentonite Waterstop shall be a 1-inch by ³/₄-inch flexible strip consisting of 75 percent sodium bentonite and 25 percent butyl rubber compound. Adhesive shall be as recommended by the waterstop supplier.

Part 3 - Execution

Preparation

Concrete to receive waterstop shall be sound with a smooth finish, free of debris, oil, grease, or other foreign material. Installation shall not proceed when work areas are flooded to the extent that would cause waterstop to hydrate; nor when precipitation can be reasonably anticipated before waterstop can be properly installed or protected. All applicable vertical and horizontal construction pour joints to receive waterstops must be encapsulated with a minimum of three (3) inches of concrete on all sides.

Installation

Components and installation procedures for Bentonite Waterstop shall be in accordance with manufacturer's printed specifications and recommendations. Install as follows:

- 1. Clean all debris, dirt and rocks from dry concrete surface.
- 2. Concrete to be free of large voids and projections.
- 3. Maintain minimum of 3 inches of clearance to edge of concrete.

- 4. Apply adhesive per manufacturer's instructions.
- 5. Remove release paper. Press the entire length of waterstop firmly against primed surface. Verify minimum concrete coverage will be maintained over entire placement of waterstop. Place in maximum practicable lengths to minimize coil end joints.
- 6. Tightly butt coil ends together to form continuous waterstop. DO NOT OVERLAP COIL ENDS. Where required cut coils with sharp knife or utility blade to fit coil ends together without overlapping.
- 7. Pour and vibrate concrete. Whenever possible do not pour concrete directly.

3.15.05 Pipe Penetrations through Concrete

[CSI 03 15 35]

Part 1 - General

Summary

Structures buried and subject to groundwater contact: As shown on the Plans.

Part 2 - Products

Materials

Provide a Link-Seal system (or approved equal).

Part 3 - Execution

Examination

Wrapping must be inspected and approved by Engineer prior to concrete pour. Gaps, tears, or looseness in wrapping will be cause for rejection.

Installation

Install Link-Seal per manufacturers instruction either within a cast-in-place sleeve or core drill a clean hole.

3.15.19 Concrete Anchors

[CSI 03 15 19 (cast-in) or 05 05 19 (drilled)]

Part 1 - General

Quality Assurance

Part 2 - Products

Materials

Concrete Anchors shall be Hilti HIT 500-V3, Simpson SET-XP, or Powers PE1000+ Adhesive Anchors.

Anchorage into non-grouted, hollow masonry cells is not allowed unless specifically called out on plans. Where allowed, anchors in unreinforced masonry cells shall be Simpson SET-XP epoxy adhesive in conjunction with the Simpson Optimesh screen.

For wall mounted equipment weighing less than 250 pounds, Simpson Titen-HD Screw Anchors may be used in concrete walls and grouted or non-grouted CMU cells.

Threaded rod shall be stainless steel except in dry locations.

Part 3 - Execution

Installation

Install in accordance with Manufacturer's recommendations. Special Inspection in accordance with IBC, Section 17, must be provided. Provide a minimum of 48 hours' notice to Engineer prior to starting installation. Concrete anchors shall not be used to resist tension or fatigue loading without Owner's evaluation and approval.

Use threaded rod or reinforcing bar as shown on the drawing, and meeting Manufacturer's recommendations. Provide minimum embedment as shown. Holes shall be drilled with carbide-tipped drill bit. Holes shall be cleaned of dust and debris. Adhesive shall be inserted with a mixing nozzle.

3.20 REINFORCING

[CSI 03 20 00]

3.21 Reinforcement Bars

[CSI 03 21 00]

3.21.11 Plain Steel Reinforcement Bars

[CSI 03 21 11]

Part 1 - General

References

ACI – American Concrete Institute- latest edition

CRSI Manual of Standard Practice - latest edition

Part 2 - Products

Materials

Grade – ASTM A706, Grade 60

ASTM A615, Grade 60 shall be permitted if:

(a) The actual yield strength based on mill tests does not exceed fy by more than 18,000 psi; and,

(b) The ratio of actual tensile strength to the actual yield strength is not less than 1.25.

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Detailing - ACI 318 and ACI 315

Lap requirements - See schedule on Plans or as required by ACI 318

Tie wire - 16 gauge minimum

Bar supports shall conform to "Bar Support Specification" CRSI Manual of Standard Practice, MSP-1-80. Provide Class 1, plastic protected bar supports. Use pre-cast concrete blocks to support bars off ground. Bar supports in water holding and buried structures shall be non-metallic.

Bar supports for the bottom rebar mat of suspended slabs or beams in water holding structures must be point supports (chairs or dobbies), not continuous.

Part 3 - Execution

Installation

Reinforcing steel shall be detailed in accordance with ACI 315 and 318 and as shown on the Plans. Lap all reinforcements in accordance with "the reinforcing splice and development length schedule". Provide corner bars at all wall and footing intersections. Bend wire bar ties away from formwork to provide the same concrete clearance as shown on the Plans to the bars.

Welding of reinforcing steel shall not be performed unless specifically approved by the Engineer. If approved, Contractor will arrange and pay for all required Special Inspections associated with welding of reinforcing steel.

Field Quality Control

Reinforcing steel shall be free of rust and loose scale at time of concrete placement. Bars with kinks, improper bends, or reduced cross-section due to any cause will not be used. Bars shall not be field bent. Bars may not be tack-welded or otherwise heated.

If, within the project warranty period, rust spots appear on the concrete due to failure to achieve proper clearance on the rebar or wire ties, the Contractor shall grind out and patch the areas using a method satisfactory to the engineer.

3.30 CAST-IN-PLACE CONCRETE

[CSI 03 30 00]

3.30.05 Common Work for Cast in Place Concrete

[CSI 03 30 05]

Part 1 - General

Delivery

Concrete shall be transported in a truck mixer to the jobsite and discharged within 1.5 hours after cement has been added to water or aggregates. Rejected concrete will be at Contractor's expense.

Part 2 - Products

Components

If allowed, curing materials shall conform to ASTM C171 and liquid membrane-forming compounds shall conform to ASTM C309. When concrete is to be coated or stained, use UV-dissipating form release and curing compounds.

Part 3 - Execution

Preparation

Do not place concrete during rain, sleet, or snow until water and freezing protection is provided.

Position embedded items accurately, and support against displacement or movement during placement.

Fill voids in sleeves, insets, anchor slots, etc., temporarily with readily removable materials to prevent entry of concrete into voids.

Before beginning placement of concrete, remove hardened concrete and foreign materials from inner surface of mixing and conveying equipment. Before depositing concrete, remove debris from space to be occupied by the concrete. Secure reinforcement in position to prevent movement during concrete placement.

At the beginning of the concrete pour for walls taller than 8 feet, place a $1\frac{1}{2}$ to $2\frac{1}{2}$ -inch thick grout pad prior to placing the concrete for the wall. Grout mix shall consist of fine aggregates, concrete and water in the same ratios as used in the wall concrete. The placement of the concrete shall proceed immediately after the grout placement so as to prevent any cold joints.

At construction joints, thoroughly clean surface of existing concrete to remove laitance. Roughen existing concrete surface to expose aggregate uniformly and apply approved bonding agent to existing concrete in accordance with manufacturer's recommendations. Prior to placing fresh concrete, dampen joint and coat with grout mixture in accordance with ACI 301, Section 8.5.

Installation

Placement shall be in accordance with IBC, Section 1905.

Place no concrete when air temperature is below or expected to be below 40 degrees during the 28-day curing period unless a low temperature concrete mix has been approved by the Owner. Provide adequate equipment for heating materials and protecting concrete during freezing or near freezing weather. Keep materials, reinforcement, forms, and ground in contact with concrete free from frost at time of placement. Heat mixing water as required. Use no materials containing ice.

Place no concrete when air temperature exceeds or is expected to exceed 85 degrees during the 28-day curing period unless a high temperature placement plan has been approved, and unless adequate precautions are taken to protect work. Cool ingredients prior to mixing. Flake ice or crushed ice of a size that will melt completely during mixing may be substituted for all or part of water. Cool forms and reinforcing prior to placing concrete.

Handle concrete from mixer, ready-mixed truck, or from transporting vehicle to place of final deposit by methods which prevent separation or loss of ingredients. Under no circumstances shall concrete that has partially hardened be deposited.

Place concrete in maximum lifts of 3 feet. Deposit concrete continuously so that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously, locate and reinforce construction joints at points as provided for in the Plans or as approved by the Owner. Maximum concrete drop shall be 5 feet.

Consolidate concrete by vibration, supplemented by hand spading, rodding, forking, or tamping. Thoroughly work concrete around reinforcement, around embedded items, and into corners of forms to eliminate air or rock pockets which may cause honeycombing, pitting, or planes of weakness. Insert and withdraw internal vibrators at points approximately 18 inches in each direction and extend into the lower concrete lifts. At each insertion, the duration shall be sufficient to consolidate the concrete; but not sufficient to cause segregation. Do not use vibrators to transport concrete within forms. Consolidate slabs by utilizing vibrating screeds, roller pipe screeds, internal vibrators, or other approved methods. Have a spare vibrator available at jobsite during concrete placing operations.

After removal of forms, cut out and patch defects in concrete surfaces. Remove form tie cones. Cut or snap off form ties to a depth of ³/₄-inch. Chip out rock pockets, holes from form tie removal, and other defects to solid concrete. Repair defects in accordance with 3.01.30.71.

Curing

See section 3.39.

3.35 Concrete Finishing

[CSI 03 35 00]

3.35.05 Common Work for Surface Finishing

[CSI 03 35 05]

Part 2 - Products

Finishes

Each concrete area that requires finishing shall conform to one of the following requirements:

• Equipment Pads – Light Brush Finish

Part 3 - Execution

Preparation

Do not place concrete which requires finishing until the materials, tools, and labor necessary for finishing the wet concrete are on the job and acceptable to the Owner. If rainfall is possible, tent the work area prior to the pour and maintain protection until the concrete is cured sufficiently to resist damage.

3.35.56 Light Brush Finish

[CSI 03 35 56]

Part 2 – Products

Finish

When concrete has appropriately set, finish with light soft broom finish. Brush perpendicular to slab slope.

Part 3 - Execution

Construction

Consolidate, strike off, and level concrete; but do not work further until ready for floating. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit floating operations. Consolidate surface with power-driven floats. Hand floating may be used if area is small or inaccessible to power units.

Field Quality Control

Check surface planeness during or after first floating. Cut down high spots and fill low spots to produce surface with tolerance of ¹/₄-inch in 10 feet in any direction. Re-float to a uniform, smooth, sweat finish concrete.

3.39 Concrete Curing

[CSI 03 39 00]

Part 2 - Products

Materials

Curing compounds are not permitted on surfaces that will receive coatings.

Part 3 - Execution

Installation

All concrete for structures, sidewalks, drives, curbs, , and where directed by the Owner, shall be water-cured in accordance with ACI 308.1 unless approved in advance by the Owner. If allowed, curing compound shall be applied immediately after finishing or form removal. When plastic or burlap covers are used to augment or protect curing, extend sheeting beyond the edges of the concrete and secure against wind lift. Inspect and adjust curing systems daily, including over weekends and holidays.

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3.40 PRE-CAST CONCRETE

[CSI 03 40 00]

3.48 Pre-Cast Concrete Specialties

[CSI 03 48 00]

3.48.50 Utility Structures

[CSI 03 48 50, 33 05 61, 33 05 63]

Part 1 - General

Related Divisions

• 13.39.13 Sanitary Sewer Manholes, Frames, and Covers

Design Requirements

All concrete structures identified on the Plans as being pre-cast, prefabricated, or not specifically detailed with reinforcing steel shall be pre-cast concrete.

Pre-cast vaults shall conform to ACI 318 and be constructed to the equivalent dimensions and functional characteristics of the specific product identified on the Plans.

Unless shown otherwise on the plans, round structures larger than 30-inch inside diameter, or rectangular structures with longest interior side 30-inches or longer, that utilize riser sections, shall be cast with an integral keyway for interlocking the riser sections.

Performance Requirements

Pre-cast structures shall be constructed to withstand anticipated construction loads that occur during transport, handling, and placement as well as the anticipated design loads. Design loads shall include the anticipated soil pressures, hydrostatic loads, and HL-93 traffic loading.

Part 2 - Products

Materials

Additional reinforcement shall be provided within the pre-cast concrete structure at all penetrations, openings, joints, and connections. The additional reinforcement shall be provided to prevent damage during shipping, handling and installation. All damaged units shall be rejected.

All precast structures that consist of sections (base, riser, lid, etc.) shall have the joints sealed with rubber gaskets or mastic, of a material appropriate for the installation.

Part 3 - Execution

Cleaning

Fill picking holes with grout flush to the structure surface, including those in vault lids. Cut, remove, and grind smooth shipping lifting hooks on the vault interior, unless directed otherwise by the Engineer.

3.60 GROUTING

[CSI 03 60 00]

3.62 Non-Shrink Grouting

[CSI 03 62 00]

3.62.13 Non-Metallic Non-Shrink Grout

[CSI 03 62 13]

Part 1 - General

Summary

Use Precision Non-Shrink Grout for grouting all equipment base plates, pipe supports, and base plates for metalwork. Precision Non-Shrink grout may also be used for all other non-shrink grouting operations. General Purpose Non-Shrink grout may be used for any applications other than those noted for Precision Non-shrink Grout. Non-shrink grout shall be used to seal all new pipe and conduit penetrations (watertight) into and out of all concrete and CMU block walled structures.

Storage and Handling

Stockpile grout to prevent contamination from foreign materials and store admixtures to prevent contamination or damage from excess temperature change

Part 2 - Products

Materials

Precision Non-Shrink Grout:

Provide a high-precision, fluid, non-shrink, quartz or non-catalyzed metallic aggregate grouting material. Provide a ready-to-use grout that hardens free from bleeding, settlement, or drying shrinkage when mixed, placed and cured at any consistency – fluid, flowable, plastic or damp-pack.

Provide precision, non-shrink natural aggregate grout that when cured produces the following properties:

- A. Compressive Strength at fluid consistency (ASTM C109-Modified): 3500 psi (24 MPa) at 1 day, 7500 psi (52 MPa) at 28 days.
- B. Passes ASTM C1107 as a grade B grout when tested as temperature minimum and maximums of 45 degrees Fahrenheit to 90 degrees Fahrenheit (8 degrees Celsius to 32 degrees Celsius) at a working time of 30 minutes. Grout must be tested at a fluid consistency per ASTM C939 and remain fluid at temperature range minimum and maximums for the 30-minute working time. All materials including water must be mixed and tested at temperature minimum/maximums.
- C. Modulus of Elasticity at 28 days at fluid consistency (ASTM C469): 3.0 x 10⁶ psi (20.7 GPa) minimum, 3.9 x 10⁶ (27.0 GPa) maximum.
- D. Coefficient of Thermal Expansion for fluid consistency (ASTM C531): 7.5 x 10⁻⁶/ degrees Fahrenheit maximum (13.5 x 10⁻⁶/ degrees Celsius).
- E. Flexural strength at 28 days for fluid consistency (ASTM C78): 1300 psi (7.9 MPa).
- F. Resistance to rapid freezing thawing (ASTM C666, Procedure A): 300 cycles- min RDF 90 percent.

- G. Split tensile strength at 28 days at fluid consistency (ASTM C496): 450 psi (3.1 MPa).
- H. Pass 24-hour grout test under stated temperature, time and fluidity constraints. See MBT Protection and Repair 24-hour Grout Form.

Precision non-shrink grout shall be MasterFlow 928 or 885 Grout or approved equal.

General Purpose Non-Shrink Grout:

General Purpose Non-shrink grout shall meet the compressive strength and nonshrink requirements of CRD-C 621, Grades B and C; Corp of Engineers Specification for Non-shrink grout; and ASTM C1107, Grades B and C. General Purpose Non-shrink grout shall be MasterFlow 713, Dayton Superior 1107 Advantage, or approved equal.

Provide curing compounds as recommended by the grout manufacturer.

Water to be used in mixing the grout shall be potable.

Mixes

Comply with grout manufacturer's recommendations for mixing procedures.

Adjust water temperature to keep mixed grout temperature in the range of 45 degrees Fahrenheit (7 degrees Celsius) and 90 degrees Fahrenheit (32 degrees Celsius) minimum/maximum.

Use cold or iced water to extend working time in hot weather or in large placements.

Use warm water in cold conditions to achieve minimum as mixed temperatures.

Part 3 - Installation

Preparation

Mechanically remove unsound concrete within the limits of the grout placement.

Remove at least ¹/₄-inch (6mm) of existing concrete facing and continue removal as required to expose sound aggregate.

Thoroughly clean the roughened surface of dirt, loose chips, and dust. Maintain substrate in a saturated condition for 24 hours prior to grouting. Surface should be saturated surface dry at time of grouting.

Clean baseplates and other metal surfaces to be grouted to obtain maximum adhesion. Remove loose rust and scale by grinding or sanding.

Comply with grout manufacturer's recommendations for form construction. Construct forms to be liquid tight.

Installation

Place grout mixture into prepared areas from one side to the other. Avoid placing grout from opposite sides in order to prevent voids. Work material firmly into the bottom and sides to assure good bond and to eliminate voids.

Ensure that foundation and baseplate are within maximum/minimum placement temperatures. Shade foundation from summer sunlight under hot conditions. Warm foundation when foundation temperature is below 45 degrees Fahrenheit (7 degrees Celsius).

Wet cure exposed shoulders for 48 hours followed by two coats of curing compound for best results. The minimal requirement is to wet cure until grout has reached final set, followed by two coats of curing compounds.

3.64 Injection Grouting

[CSI 03 64 00]

3.64.23 Epoxy Injection Grouting

[CSI 03 64 24]

Part 1 - General

Summary

This section is for the repair of cracks at least 0.005 inches wide in water holding structures that result in excessive leakage.

All requirements shall be in accordance with ACI 503-7 and as specified herein.

References

Excessive leakage shall be as determined in Section 1.75.16.52.

All products in contact with potable water shall have NSF61 certification.

Quality Assurance

A meeting with the Contractor, Owner and Engineer is required to review the procedures at least five working days in advance of the work.

Core holes as required per ACI 503.7 shall be repaired watertight and to the satisfaction of the Engineer.

Acceptance criteria given in 1.5.7.1 of ACI 503.7 may be waived if, upon additional leak testing, excessive leakage is eliminated as determined by the Engineer.

Submittals

Submittals shall be in accordance with ACI 503.7-07, Specification for Crack Repair by Epoxy Injection.

Provide documentation showing the proposed repair products used successfully on at least five similar projects.

Part 2 - Products

Materials

Materials shall be in accordance with ACI 503.7-07, Specification for Crack Repair by Epoxy Injection.

Part 3 - Execution

Execution shall be in accordance with ACI 503.7, Specification for Crack Repair by Epoxy Injection.

Division 4 Masonry (Not Used This Contract)

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Division 5 Metals (Not Used This Contract)

Division 6 Plastics and Composites

6.00 GENERAL

Sections in these specifications titled "Common Work for . . ." shall apply to all following subsections whether directly referenced or not.

6.05 Common Work for Plastics and Composites

[CSI 06 05 00]

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Structural Panels
- Structural Lumber
- Preservative Wood Treatment
- Shop Fabricated Structural Wood
- Millwork
- Wood Trim
- FRP Design and Data Sheets verifying specification requirements.

Part 3 - Execution

Construction

Provide temporary bracing, such as temporary guys, braces, false-work, cribbing, or other elements, in accordance with the requirements of the "Code of Standard Practice", wherever necessary to accommodate all loads to which the structure may be subjected, including construction loads. Leave bracing in place for as long as required for safety. Securely fasten the work as erection progresses to compensate for all loads during construction.

Perform no permanent fastening until the structure has been properly aligned.

6.10 ROUGH CARPENTRY

[CSI 06 10 00]

6.11 Wood Framing

[CSI 06 11 00]

Part 1 - General

References

U.S. Department of Commerce/National Institute of Standards and Technology - American Softwood Lumber Standard PS 20.

American National Standards Institute / American Forest and Paper Association National Design Specifications (ANSI/AF&PA NDS).

Part 2 - Products

Components

Structural lumber shall be of the nominal dimensions shown on the Plans and shall not exceed 19 percent moisture content when installed. All pieces shall be Kiln Dried Hem Fir or Spruce-Pine-Fir No. 2 grade or better unless otherwise specified on the Plans.

Lumber and other wood members shall meet requirements of ANSI/AFPA NDS: National Design Specification for Wood Construction, American Forest & Paper Association/American Wood Council, current edition. If a different edition is called out on the plans, that edition will govern.

Accessories including bolts with necessary nuts and washers, timber connectors, drift pins, dowels, nails, screws, spikes, and other metal fastenings shall conform to ASTM A-307. Provide bolts with malleable iron washers under nuts.

Nails shall be round wire of standard form. Spikes shall be button-head boat spikes. Galvanize bolts, dowels, washers, spikes, and other hardware, including nails, in accordance with ASTM A-153.

Preservative Treated Wood

All wood members which contact concrete or masonry shall be naturally durable wood or preservative-treated wood using water-borne preservatives, in accordance with AWPA U1 (Commodity Specifications A or F) for above-ground use. Coat cut ends of pressure treated wood with copper naphthenate based wood preservative.

- All fasteners in contact with preservative treated wood shall be hot-dip galvanized
- All connectors in contact with preservative treated wood shall be hot-dip galvanized
- Interior connectors in contact with preservative treated wood that are not exposed to the elements may be G185 galvanized.

Part 3 - Execution

Construction

Accurately cut and frame all lumber so that joints will have a close fit over entire contact surface. Secure lumber and piles in their proper alignment. No shimming will be permitted in making joints, nor will open joints be accepted. Bore holes in small timbers for boat or wire spikes with a bit of the same diameter or smallest dimension of the spikes, when necessary, to prevent splitting. Counterbore for countersinking wherever smooth faces are required.

Connectors and fasteners shall comply with the applicable provisions of IBC Sections 2304.9.1 through 2304.9.7. The number and size of fasteners connecting wood members shall not be less than that set forth in IBC Table 2304.9.1.

6.20 FINISH CARPENTRY

[CSI 06 20 00]

6.20.05 Common Work for Finish Carpentry

[CSI 06 20 05]

Part 1 - General

Summary

Furnish all architectural woodwork shown on the Plans and specified herein. Architectural woodwork includes all exterior and interior non-structural woodwork exposed to view in finished project including shelving, millwork, trim, and plastic laminates.

Related Sections

- Division 9.90.05 Common Work for Paint and Coating
- Division 9.90.06 Color Schedule
- Division 9.91.13. Exterior Coatings
- Division 9.91.23. Interior Coatings

References

The "Quality Standards" of the Architectural woodwork institute (AWI) shall apply and, by reference, are hereby made a part of this specification. Any reference to premium, custom, or economy in this specification shall be defined as the latest edition of the AWI "Quality Standards".

Part 2 - Products

Quality Control

Discard material with defects which might impair the quality of work, and units which are too small to fabricate the work with minimum joints or optimum joint arrangement. Finish trim boards are to be selected for straight and un-warped / un-curled shape.

Part 3 - Execution

Installation

Set carpentry work accurately to required levels and lines, with member plumb, true, and accurately cut and fitted. All exposed trim work is to be mitered at corners. Where long runs require more than one board, cut ends at 45 degrees.

Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails or finishing screws, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required. Fill nail holes with putty prior to painting. Provide adequate end and edge distances.

Install hardware specified or required to complete the project. Adjust movable parts to operate perfectly at time of final acceptance. Make further adjustments required during the guarantee period.

6.22 Millwork

[CSI 06 22 00]

6.22.13 Standard Pattern Wood Trim

[CSI 06 22 13]

Part 2 - Products

Materials

Trim board material as shown on the Plans. If not shown on the Plans, trim board shall have a smooth, untextured finish and be high density fiberboard (HDF), oak, or fir.

Part 3 - Execution

Installation

Install trim board straight and true. Miter all corners. Caulk where gaps between the trim and the mating surface are unavoidable.

6.70 STRUCTURAL COMPOSITES

[CSI 06 70 00]

6.70.05 Common Work for Structural Composites

[CSI 06 70 05]

Part 1 – General

Related Sections

5.05.23 Bolts and Other Connectors

Design Requirements

Fiberglass reinforced plastic (FRP) structural shapes shall be produced using the pultrusion process. Submit mechanical and physical properties (from ASTM coupon specimens) to the Owner for approval.

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Minimum longitudinal mechanical properties for pultruded structural shapes:			
Property	ASTM Method	Value	Units
Tensile Strength	D-638	30,000 (206)	psi (MPa)
Tensile Modulus	D-638	2.5 x 10 ⁶ (17.2)	psi (GPa)
Flexural Strength	D-790	30,000 (206)	psi (MPa)
Flexural Modulus	D-790	1.8 x 10 ⁶ (12.4)	psi (GPa)
Flexural Modulus (Full Section)	N/A	2.8 x 10 ⁶ (19.3)	psi (GPa)
Short Beam Shear (Transverse)	D-2344	4,500 (31)	psi (MPa)
Shear Modulus (Transverse)	N/A	$4.5 \ge 10^5 (3.1)$	psi (GPa)
Coefficient of Thermal Expansion	D-696	8.0 x 10 ⁻⁶	in/in/°F
		(1.4 x 10 ⁻⁶)	(cm/cm/°C)
Flame Spread	E-84	25 or less	N/A

Seal cut edges and holes according to manufacturer's instructions with a polyester resin compatible with resin matrix of structural shape and corrosion resistance equal or superior to the grating.

All finished surfaces of FRP items and fabrications shall be resin-rich, free of voids, and without dry spots, cracks, crazes, or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.

All fiberglass products in contact with potable water shall be NSF approved for potable water contact.

Part 2 - Products

Manufacturers

All FRP components equal to that manufactured by Strongwell.

6.74.13 Fiberglass Reinforced Plastic (FRP) Grating

[CSI 06 74 13]

Part 1 - General

Related Sections

5.53.05 Common Work for Gratings also applies to this specification.

Design Requirements

Deflection with a 100 lb/sf distributed load or 500 lb concentrated load (whichever is more stringent) must be less than span length/100, and no more than 0.28-inch.

Gratings shall have tested burn time of less than 30 seconds and an extent of burn rate less than or equal to 10 millimeters per ASTM D635.

Supply a copy of the ICBO report or test report from an independent testing laboratory showing ASTM-E84 flame spread and structural properties, including deflection. Test results must be less than two years old. ASTM-E84 flame spread must be less than 30.

Part 2 - Products

Materials

FRP grating shall be pultruded grating with smooth surfaces. All bearing bars and cross-bars of the grating shall be pultruded.

Finishes

Grating bars shall have a skid-resistant walking surface.

All finished surfaces of FRP items and fabrications shall be resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.

Seal all cut or damaged edges with a resin sealant of equal or superior corrosion resistance to the grating.

6.80 COMPOSITE FABRICATIONS

[CSI 06 80 00]

6.81.13 Fiberglass Reinforced Plastic (FRP) Ladder

Part 2 - Products

Components

FRP ladders shall be Strongwell fiberglass ladder system. Ladder are to be fabricated from pultruded fiberglass components as produced by Strongwell in a standard 18" rung width configuration with 12" rung spacings. Length shall be as necessary to extend from the bottom of the vault to the vault opening. The side rails shall be 2" x 2" x 0.156" square tube and the rungs shall be pultruded 1-1/4" diameter FRP fluted tube. Ladder shall include extendable ladder rail.

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Color shall be "Safety Yellow".

Division 7 Thermal and Moisture Protection

7.00 GENERAL

This division covers furnishing all labor, materials, and equipment for providing a structure that is completely weather-tight.

Sections in these specifications titled "Common Work for . . ." shall apply to all following subsections whether directly referenced or not.

7.05 Common Work for Thermal and Moisture Protection

[CSI 07 05 00]

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Thermal insulation
- Ceiling insulation
- Roofing System
- Siding
- Flashing and sheetmetal
- Vents
- Joint sealants
- Caulk

Warranty – Roofing System

The roofing Contractor shall warrant the roof system provided under this contract against leakage, and defects in materials and workmanship for a period of two years after date of project acceptance.

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7.20 THERMAL PROTECTION

[CSI 07 20 00]

7.21 Thermal Insulation

[CSI 07 21 00]

7.21.16 Blanket Insulation

[CSI 07 21 16]

Part 1 – General

Performance Requirements

Insulation shall be Kraft-paper-faced batt with the minimum R values as specified on the plans.

Part 2 – Products

Manufacturers

Ceiling insulation shall be equal to Owens Corning.

Part 3 – Execution

Installation

Provide and install ceiling insulation as shown on the project Plans. Place insulation with craft paper face down and as recommended by the manufacturer. Insulation shall be placed to the extents possible to cover the attic. Place baffles above the insulation as the slope of the roof meets the building edge.

Part 3 – Execution

Installation

The abutting joints shall be staggered so that no joint from the bottom layer of insulation lies directly below a joint from the top layer of insulation. The insulation shall be fastened using mechanical fasteners to the metal roof support deck as recommended by the manufacturer. Fasteners shall penetrate only the top ridges of the steel roof support deck.

7.27 Air Barrier

[CSI 07 27 00, or 01 83 16]

Part 1 – General

Performance Requirements

A continuous air barrier shall be provided throughout the building thermal envelope. The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8 of the 2012 Washington State Energy Code, Commercial Provisions.

Part 3 – Execution

Field Quality Control

The completed building shall be tested by the Contractor. The air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge in accordance with ASTM E 779 or an equivalent method approved by the Code Official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the Code Official. If the tested rate exceeds that defined here, a visual inspection of the air barrier shall be conducted and any

leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived.

7.40 ROOFING AND SIDING PANELS

[CSI 07 40 00]

7.42.93 Soffit Panels

[CSI 07 42 93]

Part 1 – General

Design Requirements

The panels shall be able to withstand the wind loading identified in the Plans.

Finishes

Finish all panels as recommended by the manufacturer. Color shall be chosen by the owner from a minimum of 15 colors.

Part 2 – Products

Materials

Steel panels shall be equal to AEP Span Prestige Series (PS-12) soffits. Panels shall have a Zincalume or Kynar finish. Vented and non-vented soffit panels shall have matching beads or groove widths and matching finishes. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.

Fiber Cement soffit panels shall be James Hardie Hardiesoffit or of equal. Install and finish all panels as recommended by the manufacturer. The panels shall be able to withstand the wind loading identified in the Plans. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.

Part 3 – Execution

Installation

Panels shall run perpendicular to rafters. Install panels next to transition between wall and eave as recommended by the manufacturer.

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7.46 Siding

[CSI 07 46 00]

7.46.46 Fiber Cement Siding

[CSI 07 46 46]

Part 1 – General

Design Requirements

Siding panels shall be resistant to fungus and mildew.

Finishes

Siding shall be pre-primed for finish coat. Finish color shall be chosen by the owner from a minimum of 15 colors.

Part 2 – Products

Materials

Siding shall be James Hardie HardiePanel® or equal. Install and finish siding per manufacturer's written recommendations. Siding shall be pre-primed for finish coat and be resistant to fungus and mildew.

Surface texture to be Cedarmill.

Part 3 – Execution

Installation

Install per manufacturer's written recommendations.

7.60 FLASHING AND SHEET METAL

[CSI 07 60 00]

7.61 Sheet Metal Roofing

[CSI 07 61 00]

7.61.05 Common Work for Metal Roofing

[CSI 07 61 05]

Part 1 – General

General

Work covered in this section consists of furnishing all labor, material, and equipment for preformed metal roofing as shown on the Plans and as specified herein.

Submittals

Submit shop drawings detailing all edges, hips, valleys, eaves, rakes, other flashing and include fastener schedule and in accordance with Division 1.33. Prior to Engineer review, Contractor shall have the shop drawings reviewed and approved by the system manufacturer.

The Roofer shall submit a list of a minimum of five (5) successfully completed projects with owner references, total roofing system square footage and roofing cost. The Roofer shall be regularly engaged in construction of metal roofing systems and approved to install metal roofing by the accepted system manufacturer. Such approval shall be submitted in writing along with the shop drawings as specified below.

Storage and Handling

The Contractor is responsible for continuously maintaining materials subject to precipitation or weather damage in new condition. Replace warped or weathered plywood, insulation, or other materials damaged by climatic conditions.

Follow all manufacturer's recommendations regarding product delivery, storage, and handling of materials.

Part 2 – Products

Materials

Materials shall be purchased directly from the manufacturer's commercial department to verify that the Contractor is approved by the system manufacturer to install the roofing system specified.

All materials shall be provided by one manufacturer, conform to the current IBC and the local building code.

If allowed by the IBC, local building code and if manufacturer's warranty allows, provide and install roofing felt underlayment. Felt shall be 30-pound asphalt-saturated felt, conforming to ASTM D226, Type 1 and 2, plain, unperforated.

Where required by IBC, local building code and/or to maintain manufacturer warranty provide and install ice and water shield equal to Grace Ice and Water Shield®. Material properties shall meet ASTM D412.

Fasteners shall be as recommended by the roofing manufacturer; lengths as required. Other miscellaneous exposed fasteners shall be stainless steel or ZAC (exposed head of zinc/aluminum alloy). Fasteners shall be of the length to penetrate the top ridges of the steel decking only. Fasteners shall be inserted to penetrate only the top ridges of the steel roof support decking.

Finishes

The Owner shall select the roofing color from manufacturer's standard offering of not less than 15 colors. Color options shall be provided with the submitted shop drawings.

Part 3 – Execution

Examination

Verify that work of other trades which penetrates the roof deck, or requires workers and equipment to traverse roof deck, has been completed.

Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness which will prevent the execution and quality of application of roofing system as specified. Do not proceed with application of roofing until these defects are corrected.

Preparation

Provide temporary roof during inclement weather. Requests for use of alternate structural and/or base materials with superior weathering resistance, if approved by the Engineer, may be made in lieu of temporary roof replacement. Submit a description of each temporary roof system or alternate material schedule proposed.

Provide special protection from heavy traffic on completed work. Restore to original condition, or replace work or materials damaged during handling of roofing materials.

Installation

Apply roofing felt below waterproof roof paneling, single-ply, lapped shingle fashion, 3-inch head laps and 6-inch side laps. Install no more roofing felt than can be covered by metal roofing in the same day. Roof underlayment shall be dry and free of defects prior to the installation of metal roofing.

Apply ice and water shield to manufacturer's requirements.

Apply roofing only in dry weather and when the ambient temperature is above 40 degrees Fahrenheit.

Except as otherwise shown or specified, comply with recommendations and instructions of metal roofing manufacturer.

Form and fabricate sheets, seams, strips, cleats, clips, hips, ridges, edge treatments, integral flashings, and other components of specified metal roofing to profiles, patterns, and drainage arrangement shown, and as required for permanent leak-proof construction. Provide for thermal expansion and contraction of work caused by ambient air temperature difference of 100 degrees Fahrenheit.

All openings shall be sealed from weather and to prevent recessed areas that may attract nesting animals. Panel corrugations shall be sealed with the manufacturer's standard closed cell neoprene blocks conforming to the panel corrugation. Gaps created between corrugations and flashings shall be avoided whenever possible. Where such gaps occur, they shall be sealed with manufacturer's low pitch closures, or equal. All closures shall be installed as close to the face of the opening as possible to minimize any recessed areas.

Provide uniform, neat seams with no exposure of sealant to ultraviolet light.

Flashing with a drip edge shall be installed on all edges, corners and angle points. Unless otherwise noted on the Plans extend roofing and flashing below fascia with drip edge hanging below wood supports and fascia. Valley gutters shall be provided at all valleys.

Field Quality Control

Metal roofing and its flashing shall be weather-tight. Exposed surfaces shall be free of dents, scratches, abrasions, or other visible defects.

Construction and fabrication of metal roofing shall comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) recommendations for fabrication and construction of details, expansion joints, and installation procedures, except as shown or specified.
Fabricate and install work true and accurate with lines and corners of exposed metal units. Form exposed faces and starter sections of seams flat and free of buckles, excessive waves, and avoidable tool marks considering temper and finish of metal. Hold-down attachments for roof shall be designed and spaced to resist uplift pressure due to Basic Wind Speed and Exposure as identified in the General Notes. Provide uniform, neat seams without tool marks or irregularities.

7.61.13 Standing Seam Sheet Metal Roofing

[CSI 07 61 13]

Part 2 – Products

Materials

Preformed metal roof paneling shall be equal to *Design Span HP as manufactured by AEP Span* or *Custom Bilt Metals, SL-1750 Snap-Lock Roof Panel.* The metal roofing system shall consist of 24-gauge, factory-formed, pre-finished panels with major ribs not less than 15%-inch in height.

Shop-fabricate metal in conformance with manufacturer's pattern specifications to result in a minimum 1-inch effective water dam height on both edges. Standing seam interval shall not exceed 16 inches with no stiffening ribs.

Edges, hips, valleys, eaves, rakes, and miscellaneous flashing shall be finished with matching pre-finished pieces of 24-gauge minimum, to form a weather-tight roofing system.

Roofing panels shall be factory-prefabricated in accordance with manufacturer's standard pattern and design.

www.custombiltmetals.com

https://www.aepspan.com/product/design-span-hp/

Finishes

Color options shall be provided with the submitted shop drawings. All panels and flashing shall be treated with a protective coating of Zincalume conforming to ASTM 792, AZ50, with factory-applied paint finish of Kynar 500 or Hylar 5000 with a total dry film thickness of 1 Mil. Reverse face shall be protected by a wash coat or primer.

Part 3 – Execution

Installation

Panels shall be held down to the structure with concealed clips and fasteners. The fastening schedule shall be designed by the manufacturer to resist the loads identified in the General Notes. System shall extend to full extent of fascia boards and include a drip edge unless otherwise noted on the Plans. Extend panels from eaves to ridge in one piece.

All final hand turning of seams at joints and junctions is to be of the same quality as the machine-produced seams. Practices and techniques described in the SMACNA Architectural Sheet Metal Manual are to be used as the standard of practice unless otherwise specified or shown on the Plans.

7.62 Sheet Metal Flashing and Trim

[CSI 07 62 00]

Part 1 – General

Flashing shall be factory coated steel equal to *Construction Metals Inc. Professional Grade Flashing*. Gauge shall match flashing to be replaced or 26-gauge minimum. Width shall match existing to be replaced. Provide color choices to Owner for approval. Minimum color choices are 10.

Part 3 – Execution

Installation

Install drip tight per manufacturer's requirements.

7.70 ROOF AND WALL SPECIALTIES

[CSI 07 70 00]

7.72 Roof Accessories

[CSI 07 72 00]

7.72.05 Common Work for Roof and Wall Specialties

[CSI 07 72 05]

Part 1 – General

Design Criteria

Roof ventilation shall be installed in accordance with IBC 1203. Contractor shall certify in writing that roof ventilation meets the IBC specification during the submittal process.

Part 3 – Execution

Installation

Blocking shall be installed on all exterior eaves. Ventilation baffles shall be provided at all eave vents that provide a 1-inch minimum air gap between the attic insulation and the roof sheathing. Gable end vents or roof vents shall be provided.

7.90 JOINT PROTECTION

[CSI 07 90 00]

7.92.13 Elastomeric Joint Sealants

[CSI 07 92 13]

Part 1 – General

Submittals

Submit schedule for caulk used on the project for approval prior to application.

Part 2 – Products

Materials

Concrete and Masonry

DAP® Premium Polyurethane Concrete & Masonry Sealant or equal.

Wood or Concrete Board Siding

DAP® ALEX PLUS® Acrylic Latex Caulk Plus Silicone or equal.

Doors and Windows

DAP® DYNAFLEX 230® Premium Elastomeric Sealant or equal. Where necessary to provide a suitable backstop and bond breaker, tightly pack with polyethylene foam. Rope the back of grooves, leaving a minimum depth of ¹/₄-inch for sealant. Prime surfaces as recommended by manufacturer.

Other Surfaces

Contractor shall provide caulk appropriate to surface and reason for caulk application. Caulk shall be the most durable available (longest warranty) by DAP®, or equal.

Part 3 – Execution

Installation

Caulk all joints and spaces necessary to provide a completely weather-tight product.

Apply caulking in strict accordance with manufacturer's directions with regard to temperature at application and curing times, surface condition, moisture, and cleanliness.

Apply after surfacing prime and prior to final coatings if surface is to be coated. If surface will not be coated, provide color choices to the Owner for approval prior to application.

Clean all adjoining surfaces of excess sealant, smears, or marking due to application and leave joints with neat, uniformly-filled surfaces.

8.00 GENERAL

Sections in these specifications titled "Common Work for . . ." apply to all following subsections whether directly referenced or not.

8.05 Common Work for Openings

[CSI 08 05 00]

Part 1 - General

Summary

This division covers furnishing all labor, materials, and equipment necessary for providing all interior and exterior doors, frames, and windows.

Related Sections

• Division 5.05.23 Bolts and Other Connectors

Submittals

Submittal information shall be provided to the Owner for the following items:

- Doors
- Hardware
- Locks
- Keys

8.06 Schedules for Openings

[CSI 08 06 00]

See the contract Plans for schedule of doors.

8.10 DOORS AND FRAMES

[CSI 08 10 00]

8.10.05 Common Work for Doors and Frames

[CSI 08 10 05]

Part 1 - General

Summary

This specification covers the doors, frames, accessories, and hardware for both interior and exterior man doors.

Related Sections

1.52.20 Locks and Keys

Submittals

Submittal information shall include the following:

Manufacturer's product data and installation instructions for each type of door, frame, accessory, or hardware. Include both published data and any specific data prepared for this project.

Door and frame shop drawing for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

As requested by the Engineer, provide sample color chips representing specified colors and finishes.

Performance Requirements

All exterior doors and frames shall be insulated for a maximum U-value of 0.60.

Quality Assurance

The manufacturer(s) shall be a minimum of ten (10) continuous years documented experience specializing in the manufacturing of doors, frames, accessories, and/or hardware of the type required for this project. At the request of the Engineer, the manufacturer shall provide testing and/or certification information demonstrating that the manufacturer shall design and construct all equipment to the latest applicable codes and standards. The manufacturer or their representative shall be available for consultation to all parties engaged in the project, including instruction to installation personnel.

Scheduling

The Contractor shall ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule. In addition, they shall ensure that templates and/or actual hardware requested by manufacturer are available in time for fabrication without affecting construction progress schedule.

Warranty

The Manufacturer shall provide a one (1) year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing. The Installer shall warrant installation procedures and performance for a minimum of two (2) years from the point of substantial completion against defects due to workmanship and materials handling.

Part 2 - Products

Components

Provide doors, frames, and accessories as noted on the Door Schedule. Provide door hardware as specified, as noted on the Door Schedule, and as required by the local building code.

Contractor shall provide weather tight trim around all doors whether shown on the Plans or not.

The frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads. Exterior door frames shall have an integral weather-strip at head and jambs. Frames shall be trimmed in the field to form a weather tight seal if shown on the Plans or not.

Accessories

Provide door accessories as noted on the Door Schedule.

Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable. The manufacturer shall provide door stops; no screw-on stops will be accepted.

Finishes

Prime doors and frames at the factory according to requirements for metals in Division 9.

Finishes shall be per the appropriate metal finishes in Division 9.

Part 3 - Execution

Installation

Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions. Seal metal-to-metal joints between framing members using good quality elastomeric sealant, and all doorjambs with caulking as specified.

Reinforce hinge and lock areas. Mount door using minimum of three (3) hinges.

Hang door in the frames and apply hardware in a neat, secure manner so that the doors will operate without dragging or binding.

Cleaning/Repair

Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609. Do not use abrasive, caustic, or acid cleaning agents.

Protect products of this section from damage caused by subsequent construction until substantial completion. If damage does occur, Contractor shall repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations. Replace damaged or defective products that cannot be repaired to Owner's acceptance.

8.11 Metal Doors and Frames

[CSI 08 11 00]

8.11.13 Hollow Metal Doors and Frames

[CSI 08 11 13]

Part 2 - Products

Components

Doors and frames shall comply with ANSI/SDI A250.8 for level and model and A250.4 for physical performance level. All doors shall be 1³/₄-inch thick and insulated with a solid polyurethane or urethane foam core. Exterior doors shall be Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) and fabricated from 16 gauge steel minimum. Interior doors shall be Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) and fabricated from 18 gauge steel minimum.

Door frames shall be 14-gauge galvanized steel, as manufactured or recommended by the door supplier specifically for the door installed. Frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads.

Alternatively, door frames installed within CMU walls can be 16-gauge galvanized steel, tied to the CMU with masonry wire clips. Fully grout CMU block within one length of a full-sized block measured from door frame.

Part 3 - Execution

Installation

Hardware: For installation, see Division 8 Section "Door Hardware."

Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

Clearances: Provide ¹/₈-inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide ¹/₈-inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide ¹/₄-inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

Comply with NFPA 80 for fire-rated doors.

Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

8.30 SPECIALTY DOORS

[CSI 08 30 00]

8.31.24 Building Roof Hatch

[CSI 08 31 24 or 07 72 33]

Part 1 – General

Roof Hatches shall be equal to Bilco or Acudor.

Part 2 – Products

Hatches shall have stainless steel hardware and curb mounting unit compatible with the metal roof and roof sheathing. Cover shall be aluminum with EPDM seal gasket. Curb shall be aluminum. Finish shall be aluminum mill finish.

Part 3 – Execution

Install units in strict conformance with manufacturer's recommendations. Provide and install all materials necessary for a water tight construction.

8.70 HARDWARE

[CSI 08 70 00]

8.71 Door Hardware

[CSI 08 71 00]

8.71.05 Common Work for Door Hardware

[CSI 08 71 05]

Part 1 - General

Summary

This specification covers door hardware for exterior doors. The Contractor shall provide all hardware necessary to install doors in a secure, weather-tight manner. Unless otherwise specified, all door hardware shall be according to this section.

Related Sections

1.52.20 Locks and Keys

Submittals

Door hardware submittal information shall indicate that hardware is suitable for fire- and sound-rated applications, where applicable.

Performance Requirements

All door hardware shall be selected to meet local building and fire codes.

Part 2 – Products

Components

Key cylinders shall utilize the Owner's standard core and key. The key cylinder shall fit all exterior locking hardware. A vandal-resistant cover plate shall be provided at exterior surface of doors to prevent exterior access to deadbolts or slam latches at gap between door and frame.

All exterior, and fire- and sound- rated doors and frames shall have perimeter gasketing. Weather stripping shall consist of a vinyl, neoprene, or sponge neoprene strip mounted on an aluminum or stainless steel bracket which is fastened to the door or frame. Gasketing shall be Pemko or equal.

8.71.20 Hardware for Man-Doors

[CSI 08 71 20]

Part 2 - Products

Accessories

Dead Bolt: Doors with dead bolt locks shall use a 1-inch bolt throw, with concealed mounting screws, and a satin chrome finish. The dead bolt shall be thrown or retracted by a key on the outside and by a thumb knob on the inside. The dead bolt shall be equal to Schlage.

Exterior Door Lockset

Entrance Lock (Non-Emergency Exit): Non-emergency, exterior doors shall have an entrance lock (ANSI F20) with 3-inch-wide by 16-inch-high raised plate and rectangular pull with thumbpiece and deadbolt key cylinder hole on the exterior, and a lever and deadbolt thumbturn on the inside. The latchbolt shall be retracted by the thumbpiece/lever from either side. When locked, the outside key or inside knob/lever shall retract the deadbolt and latchbolt simultaneously. The outside knob/lever remains locked until the thumbturn is restored to vertical position. Throwing the deadbolt shall automatically lock outside knob/lever. The inside lever shall always be free for immediate egress.

Exit Device (Emergency Exit): Exit devices shall be provided for the exterior door.

Exit devices shall be Dorma 9500 series mortise lock style with 3-inch wide by 16-inch high raised plate and rectangular pull with thumbpiece and cylinder hole, or equal. Panic exit hardware shall have a stainless steel satin finish and shall be equal to Von Duprin Series 98/99 panic bar.

- Key cylinders shall be interchangeable and compatible with the Owner's preferred cylinder.
- Exterior doorknobs shall have brushed stainless steel finish, or equal.
- Exterior doorknobs shall be ANSI A156.13 Series 1000 Grade 1, Schlage or equal.

Closers: Door closers shall be provided for exterior doors, fire-rated doors, restroom, and locker room doors, and elsewhere as shown in the Door Schedule on the Plans. Door closers

shall be surface mounted, parallel-arm type with an aluminum or stainless steel finish. Door closers shall be Dorma 8600 or equal. Closer shall be UL-listed for fire door rating.

Door Hinges: Door hinges shall be fabricated using polished and stainless steel and shall be equipped with permanently lubricated ball bearings. Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable.

Thresholds: All interior and exterior doors shall have an extruded aluminum threshold. Thresholds shall be Pemko or equal.

Door Stops: All doors shall have a doorstop and holder fabricated from aluminum or stainless steel. Strike shall be wall- or floor-mounted and provide automatic doorstop and hold with quick release.

Rain Drip: All exterior doors shall be equipped with an aluminum door-top rain-drip weather strip, mounted to the top edge of the door frame to prevent water intrusion. Rain drips shall be Pemko or equal.

Finishes

All hardware shall have the same finish and shall be satin nickel.

9.00 GENERAL

This division covers work necessary for providing all materials, equipment, and labor to coat all items in accordance with these specifications.

Sections in these specifications titled "Common Work for . . . " apply to all following subsections whether directly referenced or not.

9.90 PAINTING AND COATING

[CSI 09 90 00]

9.90.05 Common Work for Painting and Coating

[CSI 09 90 05]

Part 1 – General

Scope

The work specified in this Section covers the furnishing and installation of protective coating, complete in place. Shop coating and/or factory applied finishes on manufactured or fabricated items may be specified elsewhere. Regardless of the number of coats previously applied, at least two coats of paint shall be applied in the field to all coated surfaces unless otherwise specified herein.

Submittals

Before beginning any painting or coating, submit a list of coatings and manufacturers for review by the Owner. Include the application each coating is intended for, any surface preparation, number of coats, method of application, and coating thickness.

Provide color choices with physical cards prepared by the coating manufacturer. Electronic (PDF, jpg, etc.) charts, and charts made from office printers or copiers are not acceptable. If the Owner elects to make preliminary selection from an electronic or printed chart, the Contractor must provide physical samples of the colors selected for the Owner's approval.

Provide Safety Data Sheets (SDS) for all materials including solvents. Provide NSF certification for finishes in potential contact with potable water. Submit this information according to the requirements regarding shop drawings included herein.

Provide a schedule of coating operations and inspection timing. Coating inspections will be scheduled based upon Contractor-provided schedule, update schedule weekly or as necessary.

If submitted products are manufactured by a company other than the specified reference standard, provide complete comparison to specified projects including application procedures, coverage rates, and verification that product is appropriate for intended use. Provide information that demonstrates the submitted products are equal to the performance standards of products manufactured by Tnemec Corporation, which is the reference standard.

Provide shop QP-3 accreditation and shop- or contractor- inspector CIP-3 accreditation for facilities performing any pipe coating application.

Performance Requirements

All finishes potentially in contact with potable water shall be National Sanitation Foundation (NSF) 61 or 600 certified for contact with potable water. Certification from the NSF or UL shall be supplied in writing at the time of the submittal process for Finishes. Verify the submitted coatings' current NSF requirements, restrictions, and applicability to the coated items. Verify finishes used on the project are compliant with primary and secondary standards of the Safe Drinking Water Act. Any violation shall be remedied at the Contractor's expense.

The completed coating shall produce a minimum dry film thickness in accordance with the specifications as determined by the microtest thickness gauge or comparable instrument. In areas where this thickness is not developed, sufficient additional coats shall be applied to produce it.

Quality Assurance

The Contractor is responsible for compatibility of all shop and field applied paint products including the use of primer, intermediate, and top coats by different manufacturers if applicable. For any Contractor initiated substitutions, the Contractor shall verify complete compatibility between coatings provided for the project. If coatings are not compatible per manufacturer's review it is the Contractor's responsibility to remove incompatible coatings fully and replace with compatible coating systems.

Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to the underlying paint.

The Contractor is responsible for obtaining written documentation from equipment/material manufacturers regarding the date at which shop prime coatings are applied and shall strictly adhere to the coating manufacturer's recommendations for recoat time intervals. The Contractor shall submit to the Owner such documentation upon request.

Storage and Handling

Bring all materials to the job site in the original sealed and labeled containers of the paint manufacturer. Materials are subject to inspection by the Owner. Store paint supplies as recommended by the manufacturer and as approved by the Owner.

Extra Materials

For any products that have a shelf life longer than one year, provide one unbroken gallon container of each type and color of paint and each type of solvent and thinner used, as requested by the Owner. Dispose of all extra materials not desired by the Owner.

Waste Products

Collect, contain, transport, and dispose all waste products generated for this project. Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide appropriate containers for collection and disposal of waste, debris, and rubbish.

Site Conditions

Take any and all measures necessary to prevent over-spray of structures and/or components in the field from both preparation and coating work. Should over-spray occur, the Contractor is responsible for all costs associated with any damage resulting from over-spray.

Part 2 – Products

Manufacturers

The following coating system manufacturers are approved subject to compliance with the Specifications contained herein:

- 1. Tnemec Company
- 2. Sherwin Williams
- 3. International Paint (AkzoNobel)
- 4. Or Equal

The specified coating establishes the type and quality of the coating desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Owner to determine that the coatings proposed are equivalent to those named. Proposed coating shall be submitted for review in accordance with Division 1. Requests for review of equivalency will not be accepted from anyone except the Contractor.

Substitutions of the coatings of other manufacturers will be considered only if equivalent systems of coatings can be provided and only if a record of satisfactory experience with the system in equivalent applications is available. Offers for substitutions will not be considered which decrease film thickness, solids by volume or the number of coats to be applied, or which propose a change from the generic type of coating specified herein. All substitutions shall include complete test reports to prove compliance with specified performance criteria.

Part 3 – Execution

Preparation

Take any measures necessary to prevent over-spray of structures and/or components in the field from both preparation and coating work. Should over-spray occur, the Contractor is responsible for all costs associated with any damage resulting from over-spray.

Installers

Contractor is responsible for quality assurance including the retention of a coating applicator with experience necessary to complete the work as specified. Applicator's personnel shall be adequately trained for application of specified coatings. Applicator must prove adequate experience with the coatings specified for this project.

Shop-applied coatings shall be performed at a QP-3 accredited facility. Provide documentation verifying accreditation.

Examination

The Owner shall inspect and approve all field surface preparations prior to application of any coating. Provide 24-hour notice prior to surface inspection needs.

Preparation

Asbestos abatement will be required for coating removal on existing steel pipe. See Division 2 for additional information.

Prepare surfaces in accordance with the recommendations of the manufacturer of the coating to be applied to the surface, or the surface preparation requirements of these specifications, whichever are stricter. In general, all surface preparation shall meet the National Association of Pipe Fitters (NAPF), American Water Works Association (AWWA) and/or Association for Materials Protection and Performance (AMPP) (formerly the National Association of Corrosion Engineers (NACE)) as noted herein unless more strictly described by coating manufacturer.

Apply coatings only during weather meeting the coating manufacturer's recommendations. Air and surface temperatures, humidity, and all other environmental conditions shall be within limits prescribed by the manufacturer for the coating being applied, and work areas shall be reasonably free of airborne dust at the time of application and while coating is drying.

Materials shall be mixed, thinned, and applied according to the manufacturer's printed instructions. Dry Film Thickness (DFT) shall be as stated herein or applied based on coverage rates of square feet per gallon (sq. ft./gal).

Installation/Construction

Apply paint in strict accordance with manufacturer's printed instructions except that coating thickness specified herein shall govern. Finished coating on all items shall be clean, undamaged, and of uniform thickness and color.

Coat in a manner satisfactory to the Owner. The DFT listed in these specifications must be met, regardless of the applied film thickness or number of coats.

Observe all safety precautions stated in the manufacturer's printed instructions. Provide adequate ventilation and lighting at all times.

The manufacturer's recommended drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of weather, confined spaces, or other reason, longer drying times may be necessary. The manufacturer's recommendation for recoating time intervals shall be strictly adhered to.

Field Quality Control

The prime Contractor shall be completely responsible for coating quality. The Contractor shall provide both wet and dry film gauges and make such available to the Owner when requested.

If coating inspector finds anomalies and/or defects, the Contractor shall re-prep and recoat those areas per the coating manufacturer's instructions.

Acceptance of the completed coatings shall be based on the proper application and proper preparation of the coated surfaces, and a finished product that meets minimum thickness and does not contain runs, drips, surface irregularities, overspray, color variations, scratches, pinholes, holidays, and other surface signs that detract from the overall performance and/or appearance of the finished project.

If, in the Owner's sole opinion, the finished color of exterior coatings does not match that of the submitted and approved colors, the Contractor will recoat as necessary to achieve the approved color at no additional cost to the Owner.

Inspection

For metals exposed to exterior atmospheric conditions, first coat of paint or primer must be placed within four hours of passing inspection. Bare steel must be reblasted and reinspected if not successfully coated within this four-hour time frame, at the Contractor's expense.

Use the Pictorial Surface Preparation Standards for Painting Steel Surfaces (VIS-1) by the Steel Structures Painting Council (SSPC) as a visual standard for inspection of surface preparation of metal surfaces. Test-Tex Tape may also be used to verify surface profile.

Inspect each coat prior to application of the next coat. Areas found to contain runs, overspray, roughness, streaks, laps, sags, or other signs of improper application shall be repaired or recoated in accordance with the manufacturer's recommendations. Finish coats shall be uniform in color and sheen. Surface preparations and coatings not inspected and approved by the Owner will be uncovered for inspection and approval at no additional cost to the Owner.

Contractor-supplied or shop-supplied AMPP-certified CIP-3 inspector shall inspect shop-applied pipe coatings. Contractor shall submit credentials for approval by the Owner. Inspection report shall be approved for each coated component before shop/factory coated parts are shipped to the job site. Any defects found by inspector shall be addressed by the Contractor at no additional expense to the Owner.

Repair/Restoration

The Contractor is responsible for all costs associated with any damage that occurs as a result of over-spray.

Scratched, chipped, or otherwise damaged coatings, including factory coatings, shall be repaired before final acceptance will be given.

Cleaning

If any cleaning of equipment at the site is performed with solvents, such work shall be done over leak-proof linings. Preparation or coating materials may not be disposed of onsite.

9.90.06 Color Schedule

[CSI 09 06 90 or 09 90 06]

Colors of finish coatings on process equipment, piping, and building surfaces shall conform to the following schedule. All finishes shall be satin unless otherwise specified. Finish coatings, which are applied in the shop by the manufacturer, shall conform to this section. Factory coatings which are damaged shall be recoated in the field in accordance with these specifications.

Items of similar purpose shall be painted the same color. If items come from the factory with a shop applied coating that does not match said color, they shall be field coated to match. Exceptions may be listed in individual sections of these specifications.

The contractor shall allow no less than 15 working days from the time the Owner is provided with color selections for the Owner to make color choices.

The Owner will develop a color schedule for painted items after award of the contract. Provide a pallet of colors from the manufacturer of not less than 30 color choices.

9.90.13 Unpainted Items

[CSI 09 90 13]

Part 1 – General

Summary

Do not coat the following items unless specifically directed otherwise in these specifications or on the Plans.

- Aluminum, plastic, or stainless-steel items.
- Brass and copper pipe, valves, and fittings for plumbing fixtures.
- Nameplates, labels, or identification tags.
- Sensors, switches, transmitters.
- Pipe joint bolts, shackles, washers, and nuts.

Field painting is not required for equipment listed below if they come with a factory finish epoxy, polyurethane, or powder coat. Items supplied with only a factory prime coat must be field coated.

- Motors
- Control valve pilot systems
- Sensor piping systems
- Valves
- Flow meters
- Electrical panels

9.91.13 Exterior or Damp Environment Painting

[CSI 09 91 13]

9.91.13.01 - System 1: Metals – Exterior and Wet Conditions including Doors, Windows, and Frames

[CSI 09 91 13 13]

Part 2 - Products

- 1. Tnemec
 - a. <u>Prime Coat</u>: Series 27 Fast Cure Epoxy (3 to 5 Mil DFT)

- b. Finish Coat: Series 1095 EnduraShield (3 to 5 Mil DFT)
- 2. Sherwin Williams

For products that are supplied in bare (unprimed) metal:

- a. Primer: Corothane 1 Galvapac Zinc Primer B65G11 (2.5 to 3.5 Mil DFT)
- b. <u>Finish Coat</u>: Acrolon 218HS B65-650 Series (3 to 5 Mil DFT)

For products that are supplied with a shop prime coat:

- a. <u>Primer</u>: Shop
- b. <u>Intermediate</u>: Macropoxy 646FC B58-600 Series (5 to 8 Mil DFT)
- c. <u>Finish Coat:</u> Acrolon 218HS B65-650 Series (3 to 5 Mil DFT)
- 2. International Devoe
 - a. Primer: Fast Set Option: Devran 261QC Epoxy
 - i. Cold Cure Option: BarRust 235 Epoxy
 - ii. Summer Option: BarRust 231 Epoxy Mastic (4 to 6 Mil DFT)
 - b. Finish Coat: Fast Set Option: DevThane 349QC Aliphatic Polyurethane
 - i. Commercial Option: DevThane 389 Aliphatic Polyurethane
 - ii. Premium Gloss Option: DevThane 379 UVA Aliphatic Polyurethane
 - iii. Premium SemiGloss Gloss Option: DevThane 378 UVA Aliphatic Polyurethane. (2 to 3 Mil DFT)

Part 3 - Execution

Surface Preparation

- 1. Clean, dry, and free of all dirt, oil, grease, and other contaminants.
- 2. For new work: SSPC-SP1 solvent cleaned.
- 3. For coating over existing painted surfaces: Remove all loose and damaged coatings. Prepare with SSPC-SP2 hand tool or SP3 power tool cleaning.
- 4. All hollow metal doors, windows, and frames shall be bonderized, pickled, or phosphatized, which will serve as a primer for and shall be compatible with the finish coat to be applied in the field

9.91.13.10 - System 2: Wood - Exterior, Painted

[CSI 09 91 13 17]

Part 1 - General

Exterior wood surfaces, including, but not limited to trim, soffit, siding, and other similar surfaces.

Part 2 - Products

- 1. Tnemec
 - a. <u>Prime Coat</u>:
 - i. <u>Rough or open grain wood:</u> Series 115 Uni-Bond or 151-1051 Elasto-Grip (250 to 300 square feet per gallon)
 - ii. <u>Smooth wood:</u> Series 115 Uni-Bond (250 to 300 square feet per gallon)
 - b. Intermediate Coat: Series 1029 Enduratone (4 to 6 Mil DFT)
 - c. <u>Finish Coat</u>: Series 156 EnviroCrete (4 to 6 Mil DFT)
- 2. Sherwin Williams
 - a. <u>Primer</u>: Exterior Latex Wood Primer (250 to 300 square feet per gallon)
 - b. Intermediate Coat: A-100 Exterior Latex (1.5 Mil DFT)
 - c. <u>Finish Coat</u>: A-100 Exterior Latex (1.5 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Surface clean, dry, and free of contaminates.

9.91.23 Interior Painting

[CSI 09 91 23]

9.91.23.12 - System 3: Wood – Interior, Painted

[CSI 09 91 23 19]

Part 1 - General

Interior painted wood surfaces, including, but not limited to trim, plywood ceilings, walls, and other similar surfaces.

Part 2 - Products

- 1. Tnemec
 - a. <u>Primer</u>: Series 115 Uni-Bond or 151-1051 Elasto-Grip (1.0 to 1.5 Mil DFT)
 - b. <u>Intermediate Coat</u>: Series 1029 EnduraTone (2 to 4 Mil DFT)
 - c. <u>Finish Coat</u>: Series 1029 EnduraTone (2 to 4 Mil DFT)
- 2. Sherwin Williams
 - a. <u>Primer</u>: PrepRite ProBlock Int/Ext Latex Primer Sealer B51 Series (1.0 to 1.5 Mil DFT)
 - b. Intermediate Coat: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)

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c. <u>Finish Coat</u>: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)

Part 3 - Execution

Surface Preparation

Surface clean, dry and free of contaminates.

9.91.33 Submerged and Buried Metals Painting

[CSI 09 91 33 or 09 97 00]

9.91.33.05 - System 4: Shop-Prepared Ferrous Pipe

[CSI 09 97 13 30]

Part 1 - General

This Section applies to all proposed ductile/cast iron and steel piping within vaults, including any segment of pipe which extends from inside the vault through the wall. Do not coat stainless steel materials unless specified otherwise. Do not coat meters or valves, in accordance with Division 9.90.13. For the purposes of this coating system, metals which are buried or which are located within a vault or manhole shall be considered as under immersion service conditions.

Part 2 - Products

Shop Application:

- 1. Tnemec
 - a. <u>Primer</u>: Series 1 Omnithane (2.5 to 3.5 Mil DFT).
 - b. Intermediate Coat: Series N69 Hi-Build Epoxoline II (6 to 8 Mil DFT)
- 2. Sherwin Williams
 - a. <u>Primer</u>: Corothane 1 Mio-Zinc Primer (2.5 to 3.5 Mil DFT)
 - b. Intermediate: Macropoxy 646FC B58-600 Series (6 to 8 Mil DFT)

Field Application, for piping within vaults/manholes/buildings (omit for buried portion of pipe):

- 1. Tnemec
 - c. Finish Coat: Series 73 or 1095 Endura-Shield (3 to 5 Mil DFT)
- 2. Sherwin Williams
 - c. Finish Coat: Acrolon Ultra B65-830 Series (2 to 3 Mil DFT)

Part 3 - Execution

Preparation

Surface preparation shall be per manufacturer's requirements.

- 1. Ferrous Metals
 - a. SSPC-SP10 Near white metal blast cleaning.

- 2. Ductile and Cast-Iron Materials
 - a. Per manufacturer's requirements for immersion service. If manufacturer does not provide requirements, provide SSPC-SP1 followed by NAPF 500-03-04/05 Grey White Blast. Ductile Iron pipe shall be purchased <u>without</u> the standard asphaltic coating. Removal of asphalt coatings is extremely difficult and overly aggressive preparation can create a damaged surface unsuitable for coating.
- 3. Prepare and coat all exposed bolt heads, threads, washers, nuts, and tie rods with the same system as the pipe.

9.99.33.10 - System 5: Steel Pipe Exterior Field Repair

[CSI 09 97 13.30]

Part 1 - General

Summary

This Section applies to exterior coating of steel pipe cut where existing coating system has been removed. System shall be per AWWA C217.

Part 2 - Products

Materials

1. Trenton Wax-Tape #2 Self-Firming Anticorrosion Wrap for Belowground Use

Part 3 - Execution

Preparation

Install per manufacturer's recommendations.

9.97.23 Concrete and Masonry Coatings

[CSI 09 97 23]

Part 1 - General

Scheduling

Most coatings on concrete will require a 28-day concrete curing period prior to coating. Schedule the work accordingly. No additional monetary or time compensation will be given for failure to plan for the required curing duration.

9.97.23.07 – System 6: Concrete Vault Interior

[CSI 09 97 23 19]

Part 1 – General

Summary

Do not coat interior walls unless noted otherwise on the Plans or stated herein.

9.97.23.08 – System 7: Concrete Vault Exterior – Bottom and Walls

[CSI 09 97 23 20 or 07 14 16]

Part 2 – Products

Materials

- 1. Tnemec
 - a. <u>One coat</u>: Series 46H-413 Hi-Build Tneme-Tar. (16 to 20 Mil DFT)
- 2. Sherwin Williams
 - a. <u>One coat</u>: Hi-Mil Sher-Tar Epoxy. (16 to 20 Mil DFT)
- 3. International Paint
 - a. DevTar 5A High Solids Coal Tar Replacement Epoxy Coating. (16 to 20 Mil DFT)

Part 3 – Execution

Preparation

Allow 28-days cure time for concrete, or until passing the ASTM D 4263 Plastic Mat Test. Surface shall be clean, dry, and free of contaminants.

9.97.23.14 – System 8: Concrete Siding Exterior Colored Coating

[CSI 09 97 23 27]

Part 1 - General

Summary

Exterior surface of above grade concrete, Hardie siding, and CMU walls. This coating system is intended to function as colored coating with waterproofing improvement.

Part 2 – Products

Materials

- 1. Sherwin Williams (Waterproofing Acrylic System, satin sheen)
 - a. <u>Prime Coat:</u> LX21-50 Series, Loxon XP, Waterproofing Masonry Coating, DFT: 6.5-8.0 mils
 - b. <u>Finish Coat:</u> LX21-50 Series, Loxon XP, Waterproofing Masonry Coating DFT: 6.5-8.0 mils

Note: 10 or fewer pinholes per square foot is required for a waterproofing system.

Part 3 – Execution

Surface Preparation

Clean, dry and free of contaminants- SSPC SP13 / NACE No. 6 (ICR 310.2R, CSP 1-3) light surface preparation required.

9.97.23.14 – System 9: Concrete Entrance Sealer

[CSI 09 97 23 29 or 07 19 16]

Part 2 – Products

Materials

- 1. Tnemec
 - a. Chemprobe Dur A Pell 40 (100 sq. /ft. per gallon coverage based on smooth precast concrete. See product data sheet for coverage on other concrete surfaces.)
- 2. Sherwin Williams
 - a. Loxon 40 percent Silane Water Repellant (125 -175 sq./ft. per gallon coverage based on smooth precast concrete. See product data sheet for coverage on other concrete surfaces.)
- 3. International Paint
 - a. RainGuard Blok-Lok (60-125 sq./ft. per gallon coverage based on smooth precast concrete. See product data sheet for coverage on other concrete surfaces.)

Part 3 – Execution

Preparation

Surface Preparation

Prepare surface to clean, bare concrete free of contaminants including dust, oil and water. Apply sealer to concrete until it has moist appearance using a garden sprayer. Clean the surface to remove purged matter and allow it to dry a minimum of 24 hours. Repeat process to apply two coats.

Construction

Apply concrete sealer to the following locations:

• Concrete landing

Division 10 Specialties (Not Used This Contract)

11.00 GENERAL

Sections in these specifications titled "Common Work for . . ." apply to all following subsections whether directly referenced or not.

11.05 Common Work for Equipment

[CSI 11 05 00]

Part 1 - General

Submittals

Provide submittal information to the Owner for the following items:

- Sump Pumps
- Heaters

11.10 PUMPS

[CSI 43 20 00]

11.12.10 Sump Pump

[CSI 22 14 29.16]

Part 1 - General

Performance Requirements

Minimum performance of 20 gpm at 20-foot lift.

Part 2 - Products

Manufacturers

Sump pump: equal to Myers MS Series sump pump, model MS33V.

Materials

Provide a sump pump with corrosion resistant material motor housing and an oil-filled motor with thermal overload protection. Solids handling up to ¹/₄-inch solids. Dual ball-bearing motor and double lip shaft seal. Case iron volute case. Sump pump shall be controlled by integral float switch.

11.95.83.33 Radiant Space Heaters

[CSI 23 83 33]

Part 1 – General

Design Requirements

Heater(s) shall be suitable for installation in the environment where installed.

Furnish and install wall-mounted space heater(s) as shown on the Plans.

Part 2 – Products

Manufacturers

Heaters shall be as specified on the Plans. Equals will be accepted.

Components

Space heaters shall be electric air element type of the size and location shown on the Plans. Provide with a universal mounting bracket, a disconnect switch and mounting hardware. Provide contactors in heater to interface with control relays and 480V power supply.

Provide with a built-in thermostat having an adjustable range from 40 to 90 degrees Fahrenheit. Set thermostat at 60 degrees Fahrenheit unless specified otherwise on the Plans.

Part 3 – Execution

Installation

Mount bottom of heater(s) per the Plans. Provide clearance from walls, ceiling and obstacles as recommended by the manufacturer.

Division 12 Furnishings (Not Used This Contract)

Division 13 Special Construction (Not Used This Contract)

Division 14 Conveying Systems (Not Used This Contract)

15.00 GENERAL

This division covers the work necessary for furnishing and installing mechanical appurtenances and accessories as described in these Specifications and shown on the Plans.

Sections in these specifications titled "Common Work for . . ." shall apply to all following subsections whether directly referenced or not.

15.05 Common Work for Mechanical

[CSI 33 05 00]

Part 1 - General

Summary

Provide the necessary piping, plumbing, fittings, and appurtenances to make all piping systems complete, tested, and ready for operation as specified herein and as shown on the Plans. Some fittings that are necessary for the complete piping system installation and operation may not have been shown. Provide fittings, pipe, and appurtenances necessary, whether shown on the Plans or not, to make all piping systems complete, tested, and ready for operation.

Some pipe supports, thrust blocking, and tie rods are not shown on the Plans. Provide pipe supports, thrust blocking, and tie rods for pipes as required by accepted design criteria to support and restrain the loads encountered.

Related Sections

- Division 1.81.30 Seismic Restraint and Anchorage
- Division 1.81.40 Pressure Ratings
- Division 1.81.50 Materials in Contact with Drinking Water
- Division 10.14.23 Panel Signage

References

All products in contact with drinking water to be low-lead (less than 0.25 percent) content in compliance with NSF/ANSI 372.

Submittals

Submittal information shall be provided to the Owner for the following items:

- Ductile iron pipe
- Ductile iron fittings
- Steel pipe and fittings
- Copper pipe and fittings
- PVC pipe and fittings

- Isolation valves
- Control/Throttlevalves
- Flow meters
- Pressure gauges
- Other mechanical components listed in this division or required by the Engineer

Part 2 – Products

Materials

All valves, meters, specialties, appurtenances, and other such mechanical and plumbing components that are of similar purpose shall be of a single manufacturer and model line. Do not "mix and match" unless specifically stated otherwise or allowed by the Engineer. The intention of this requirement is to maintain consistency across all components installed on the project for function, maintenance, aesthetics, and details of installation.

Part 3 - Execution

Field Quality Control

Pressure gauges used for testing and commissioning shall be in good working order and scaled appropriately for the test. Scale range shall not exceed 200% of the test pressure. For example, for a 250 psi test, the gauge scale shall not exceed 500 psi. The Owner has the right to reject any gauges that are suspect in their accuracy.

If any components that have been approved by the Owner are not rated for the specified system test pressure, remove or isolate those components during pressure testing in a method acceptable to the Owner. Said components must still be pressure tested in their permanent configuration at their individual test pressure rating.

15.10 BURIED PIPE INSTALLATION

[CSI 33 05 05]

Part 1 – General

Site Conditions

Existing soils are unclassified except where specifically identified on the Plans or specification.

Part 3 - Execution

Preparation

Pothole ahead of pipe-laying a sufficient distance at known utility crossings and where noted on the plans to allow room to make vertical adjustments as necessary to avoid existing utilities and make connections. Should the Contractor fail to pothole identified utility crossings, any subsequent adjustments necessary shall not be cause for cost or time claim.

Provide the results of potholing to the Owner no less than two calendar days in advance of utility installation. Provide a written record of size, materials, and locations for found utilities

to an accuracy of 0.5 foot horizontal and 0.1 foot vertical. Failure to record locations clearly and legibly will result in non-payment.

Installation

Install pipes to the depth shown on the trench detail, unless superseded by depth shown on the profile. Unless specified otherwise, install pipe to the following tolerances:

- Pressure pipes: 0.5 feet horizontal, 0.2 feet vertical. Regardless of vertical tolerance, do not create new high points not otherwise shown on the plans.
- Gravity pipes: 0.5 feet horizontal, 0.03 feet vertical. Regardless of vertical tolerance, do not lay pipe with reverse slope.

All non-metallic pipe, including service and air valve lines, shall include a tracer wire taped every 5 feet to the top of the pipe. Loop tracer wire to the surface in accessible locations such as valve boxes, meter vaults, or other surface access. If no access is available for more than 1,500 feet, provide a valve box specifically for the tracer wire. Wire shall be solid UF, 12AWG minimum for 2,000 foot runs and less, or 10AWG for runs longer than 2,000 feet.

Keep openings in pipe closed during the progress of work. Install plugs to prevent water and debris from entering pipe. No payment will be made to clean pipes.

15.11 Open Trench Pipe Installation

[CSI 33 05 05]

15.11.11 Pressure Pipe Installation

[CSI 33 05 05]

Part 1 - General

References

Use materials and installation methods in accordance with the latest edition of the Uniform Plumbing Code and local codes and regulations that are applicable.

Scheduling

Connections to live mains shall be made only after contacting the Owner 48 hours prior (not including weekends or holidays). Connections to live mains may only be performed on Tuesdays, Wednesdays, or Thursdays unless permission is obtained otherwise from the Owner. Connections shall not be performed on Owner recognized holidays.

Service to customers shall not be interrupted for more than 4 hours and must occur between the hours of 8:00 AM and 5:00 PM. The Owner will notify customers no less than 48-hours in advance of service interruption. If, in the opinion of the Owner, the Contractor has not adequately scheduled the work to occur within these timeframes, the Owner may cancel the service interruption. No time or monetary compensation will be provided for such cancellation.

If a service interruption extends beyond these timeframes and, in the opinion of the Owner, the extended service interruption was caused by the Contractor's failure to properly schedule

or perform the work, the Owner has the right to charge liquidated damages in the amount of one-half calendar day for each occurrence.

Part 3 - Execution

Installation

Install pipes in accordance with the manufacturer's recommendations. Use types and sizes of pipes as specified herein and/or as shown on the Plans. Where small pipe sizes are omitted from the Plans and not mentioned in the specifications, use sizes corresponding to code requirements and as required by equipment and plumbing fixtures and appurtenances. Properly size any undesignated pipe sizes for the functions to be performed.

Lay pipe and supports at proper lines and grades. Follow the piping runs shown on the Plans as closely as possible, except for minor adjustments to avoid architectural and structural features. Make major relocations, if required, in a manner acceptable to the Owner.

Keep openings in pipes closed during progress of work.

Form thrust blocking so that bolts, joints, gaskets, and flanges of adjacent joints are clear of concrete allowing bolts and joints to be dismantled without removing concrete. All concrete blocking shall have a minimum compressive strength of 4,000 psi unless identified otherwise in Division 3 or on the Plans.

Pipe passing through concrete walls or slabs shall be made watertight as identified in Division 3 or on the Plans.

Trenches shall be excavated to a sufficient width to allow for pipe installation, compaction equipment, and shoring when necessary. Maximum trench width shall not exceed 36-inch plus OD for 4-inch and larger pipe, or 24-inch plus OD for 3-inch and smaller pipe for pay items or related materials including but limited to crushed surfacing, patching, import bedding, import backfill, and rock excavation.

Bedding shall be mechanically compacted in lifts no greater than 8-inches from base to springline and from springline to top of pipe using a jumping jack or sheepsfoot. Hoe-packs, sheepsfoots, and vibratory rollers shall not be used within 12-inches directly above the pipe. Compact trench backfill in lifts not exceeding 18-inches loose-thickness.

Flanged Joint Assembly

- 1. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe. Clean flanges by wire brushing before assembling. Clean flange bolts and nuts by wire brushing; lubricate bolts with graphite or oil.
- 2. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension. Bolts shall have minimum of two threads showing beyond the nut.
- 3. Tighten joints carefully to prevent strain upon valves, pumps, and other equipment.
- 4. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or re-tighten the bolts and nuts, and retest the joints. Replace the gasket if damaged.

Field Quality Control

Make no permanent connections to the existing water system until the new water main has been tested and approved by the Owner. No temporary connections of the untested, unapproved new water main to the existing water system shall be made without the installation of a double check valve assembly between the new water main and the existing water system. The Contractor shall verify the size, material, and location of the existing main at the connection point prior to installing the new water main.

The Contractor shall provide all labor and equipment for earthwork, traffic control, trench safety, materials for connections and labor to make the final connection to the existing water system.

15.13 Above Grade Mechanical Installation

15.13.02 Exposed Piping Installation

[CSI 40 05 05]

Part 1 – General

Summary

This section is for exposed major pressure pipe systems such as booster stations, lift stations, treatment facilities, control valve vaults, etc. Testing of minor service plumbing systems shall follow the IPC/UPC.

Part 3 - Execution

Installation

When systems include drain ports that operate automatically, provide ancillary drainage plumbing. Route pilot, air valve, pump seal, and other drains to the structure drain using schedule 40 PVC with diameter equal to the device drain outlet diameter, but no smaller than 1/2-inch. Copper pipe may be used only with Owner approval. Multiple drain lines may be connected together if approved by the Owner. Secure to fixed structures or large pipe using pipe clamps. Do not install drain pipe where it will be a tripping hazard or interfere with normal maintenance. Slope downwards to termination. Terminate the outlet two times the drain pipe diameter above the drain grate or funnel and cover end with #24 stainless or aluminum screen. Install a union near the start of each drain pipe to allow disassembly without cutting.

Preparation

Provide all personnel and equipment required and complete all tests required to demonstrate the integrity of the finished installation for the approval of the Owner and all agencies having jurisdiction.

Secure the pipe and fittings to prevent movement under pressure. Furnish and install temporary blocking where permanent blocking is not required and remove it after testing.

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the

Contractor. Gauges used in the test may be required by the Owner to be certified for accuracy at a laboratory.

Tests/Inspection

Hydrostatic Pressure Testing

Test all water systems and appurtenances with a hydrostatic test pressure equal to that specified under Division 1.81.40 of these Specifications. The Owner has the right to require more stringent test criteria than stated in this specification or in the pressure rating section the Owner determines that field conditions warrant such measures.

Fill the piping systems with water and allowed to stand under pressure for a minimum of 24 hours to allow air to escape and allow the lining of the pipe to absorb water. The Owner will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation. The Contractor is responsible for the proper disposal of any waste, including water.

Visible leakage is unacceptable and shall be corrected. Should the test section fail to meet the specified pressure test successfully, the Contractor shall locate and repair the defects and then retest the pipeline at his own expense.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment completely set up and ready for operation and shall have successfully performed the test to assure that the pipe is in a satisfactory condition. The Owner shall witness the test. If the test does not pass inspection for any reason, additional trips required to witness another test shall be done at the Contractor's expense.

Before applying the specified test pressure, expel air completely from the system.

The test shall be accomplished by pumping the piping system up to the required pressure; stop the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the Owner, and then pump the system up to the test pressure again. During the test, the section being tested will be observed to detect any visible leakage. A clean container shall be used for holding water for pumping pressure on the system being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l (ppm).

Sections to be tested shall be isolated and pumped to test pressure. Test pressure shall be sustained for a minimum of 60 minutes with no loss in pressure throughout the test duration with Owner present and on site throughout test duration. If test results show drop of pressure, Contractor shall repair leaks and retest until testing is passed in presence of Owner. Owner shall bleed off pressure from pump to piping connection once test is passed to verify system piping was tested.

15.18 Buried Piping Inspection and Testing

[CSI 33 05 05]

15.18.02 Buried Pressure Pipe Inspection and Testing

[CSI 33 05 05, 33 05 05.31]

Part 3 - Execution

Preparation

Provide all required personnel and equipment and complete all tests required to demonstrate the integrity of the finished installation for the approval of the Owner and all agencies having jurisdiction.

Backfill the pipeline trench sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and sufficiently cured to reach design strength before testing. Furnish, install, and remove temporary blocking where permanent blocking is not required and remove it after testing.

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the Contractor. Gauges used in the test may be required to be certified for accuracy at a laboratory by the Owner. Gauge range shall not exceed 200-percent of the test pressure.

Tests/Inspection

Water Main Flushing

The pipeline, valves and other components not already flushed by polypig shall be flushed or swept clean. Flushing shall allow four complete exchanges of water and remove any obvious debris.

The following blow off sizes are the minimum required for flushing with a supply pressure of 40 psi minimum and no more than 20 feet of hose is used, unless stated otherwise.

Main	Flow at 2.5	Blowoff and Backflow
Diameter	tps	Device Diameter
18"	2,000 gpm	(4) 3"

Hydrostatic Pressure Testing

Cover any exposed pressurized PVC pipe to protect from direct sunlight if the air temperature is above 70°F.

Test all pipelines and appurtenances under a hydrostatic test pressure equal to that specified under Division 1.81.40 of these Specifications. The Owner has the right to require more stringent test criteria than stated in this Specification or in the pressure rating section if it is determined that field conditions warrant such measures.

An acceptable test of pipe and fittings buried under or adjacent to concrete slabs or other structures must be performed prior to construction of the structure.

The Owner will furnish the water necessary to fill the pipelines and for testing at a time of day when sufficient quantities of water are available for normal system operation.

Fill the pipelines with water and allow to stand under pressure for a minimum of 24 hours to allow air to escape and allow the lining of the pipe to absorb water. The Contractor is responsible for the proper disposal of any waste, including water.

Fittings and sections of pipe that cannot be pressure tested, such as connections to the existing system, shall be left exposed for a visual inspection under system pressure. Any visible leakage shall be corrected by the Contractor to the satisfaction of the Owner regardless of the allowable leakage specified herein. Should the test section fail to meet the specified pressure test successfully, the Contractor shall locate and repair the defects and then retest the pipeline at their expense.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment completely set up, ready for operation, and have successfully performed the test to assure that the pipe is in a satisfactory condition. The Owner shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness another test shall be done at the Contractor's expense.

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and appurtenances.

The test shall be accomplished by pumping the main up to the required pressure; stop the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the Engineer, and then pump the main up to the test pressure again. During the test, the section being tested shall be observed for visible leakage. A clean container shall be used for holding water for pumping pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l (ppm).

Sections to be tested shall be isolated and pumped to test pressure. Test pressure shall be sustained for a minimum of 60 minutes with less than 2-percent (5 psi) loss in pressure throughout the test duration with Owner present and on site throughout test duration. If test results do not comply, Contractor shall repair leaks and retest until testing is passed in presence of Owner. Owner may bleed off pressure from pump to piping connection once test is passed to verify system piping was tested.

15.18.03 Valve Testing

Part 3 - Execution

Testing

All valves shall be pressure tested. Do not exceed the rated working pressure of the valve when operating the valve. Bleed off test pressure prior to operating. Check all valve bonnet fasteners for tightness.

Pre-Installation

All buried valves shall be pressure tested outside the trench. Gate valves shall be tested on one side of the closed seat. Butterfly and eccentric valves must be tested on both sides of the closed seat.
Valve clusters shall be pre-assembled and tested as a unit. Provide end plugs, blind flanges, assembly kits, and all appurtenances necessary for pressure testing. Valve testing shall use the following procedure.

- 1. Close the valve.
- 2. Install plug or flange (with test port).
- 3. Connect test apparatus and pump.
- 4. Pressurize to test pressure. or manufacturer's listed test pressure if less.
- 5. There shall be zero drop in pressure or visible leakage for one minute. This includes leaking through the shaft packing.
- 6. If test fails, check for defects, correct, and retest. Valves that do not pass testing will be replaced by the Contractor at no additional cost to the Owner.

Post-Installation

Test all valves for water tightness under differential working pressure. To perform this test, pressurize pipe section with valve in place, close valve and relieve pressure on seat side of the valve. The valve shall not pass water during a 5-minute test period.

Operate all valves at least once from closed-to-open-to-closed positions while valve is under working (not test) pressure.

15.20 PIPE AND FITTINGS

15.21 Common Work for Pipe and Fittings

[CSI 33 05 00 or 40 05]

Part 2 - Products

Components

Under no circumstance shall the fasteners be of lesser strength or higher corrosive potential than the materials being connected. If dissimilar metals are adjacent (for example: stainless steel flange connecting to ductile iron flange) a dielectric insulation kit shall be used.

Fasteners for pipe and fittings: Per AWWA standards unless otherwise specified. All relevant subsections of AWWA C100, C200, and C500. All bolts and studs shall be long enough so that no less than two threads extend beyond the face of the nut. Non-submerged flange bolts to be ASTM A307 Grade A, zinc plated.

Finishes

For conditions other than submerged, all nuts and bolts shall be zinc plated, and suitable for above and below grade locations as required. Where above grade/exposed piping is specially coated, the connecting nuts and bolts shall be coated using the same system unless directed otherwise by the Owner.

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Part 3 - Execution

Construction

All piping and related equipment to be joined shall be connected as shown on the Plans, specifications, as recommended by the manufacturer or as required by standard industry practices if not otherwise specified.

15.22 Metal Pipe and Fittings

15.22.02 Ductile Iron Pipe and Fittings

[CSI 33 05 19 or 40 05 19]

Part 1 - General

Design Requirements

Ductile iron pipe shall have thickness designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressures to meet the requirements of Division 1.81.40.

Part 2 - Products

Manufactured Units

Pipe shall be cement-lined and asphaltic coated in accordance with ANSI Standard A21.4 (AWWA C104) unless otherwise specified and shall conform to ANSI Standard A21.51 (AWWA C151).

Rubber gasket pipe joints are to be push-on-joint (Tyton) or mechanical joint (MJ) in accordance with ANSI Standard A21.11 (AWWA C-111), unless otherwise specified.

Flanged joints shall conform to ANSI Standard B16.1.

When requested, furnish certification from the manufacturer of the pipe and gasket being supplied that inspection and all of the specified tests have been made, and the results comply with requirements of this standard.

Ductile Iron Fittings

All fittings shall be ductile iron where possible. Steel fittings will not be accepted where ductile iron is called out on the plans. Ductile iron fittings shall be short-body, cement-lined, and for the pressure rating noted in Division 1.81.40. Metal thickness and manufacturing processes shall conform to applicable portions of ANSI Standards A21.20, A21.11, B16.2, and B16.4.

Standard cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C104).

Mechanical joint (MJ), ductile iron, compact fittings 3-inches through 24-inches, and 54- inches through 64-inches shall be in accordance with AWWA C153.

Flanged pipe spools shall be fabricated from minimum Class 53 wall thickness pipe and conform to ANSI/AWWA C115/A21.15 with the exception that flanges shall be fabricated from ductile iron unless otherwise specified in the Contract Documents. Interior shall be cement lined.

Ductile iron flange (FL) fittings shall be in accordance with AWWA C110 and fabricated from ductile iron unless otherwise specified in the Contract Documents with a bolt pattern to match adjacent pipe. Gasket material for flanges shall be Styrene Butadiene Rubber (SBR, Buna-S), neoprene, nitrile rubber (NBR, Buna-N), chlorinated butyl, or cloth-inserted rubber. Gaskets shall be a minimum of 1/8-inch thick.

Type of ends shall be specified as mechanical joint (MJ), restrained joint (RJ), true restrained joint (TRJ), plain end (PE), or flanged (FL).

Finishes

For above grade and exposed pipes, including those inside structures, prepare surfaces and coat the exterior per Division 9.91.13.13.

Part 3 - Execution

Installation

Install ductile iron water mains in accordance with AWWA C600. Provide tools and equipment, including any special tools required for installing each type of pipe used.

The amount of deflection at each pipe joint shall not exceed 3-degrees per joint (11 inches over 18 feet), or the manufacturer's printed recommended deflections, whichever is less.

15.22.06 Copper Pipe and Fittings

[CSI 33 05 17 or 40 05 17]

Part 1 - General

Design Requirements

Copper piping and tubing shall meet the requirements of ASTM B-88. Solder fittings shall meet the requirements of ANSI B16.22. Flared fittings per ANSI B16.26 and allowed only for working pressure less than 150 psi. Lead content of solder shall be no more than 0.2 percent.

Part 2 - Products

Materials

Exposed, interior:

Type K or L hard pipe with soldered fittings.

Soft pipe may be used only where approved by the Owner or shown on the plans. Soldered fittings for all sizes. Flared fittings only on 1/2-inch and smaller soft pipe.

Concealed, interior:

Type K or L hard pipe with soldered fittings.

Type K or L soft pipe with soldered fittings (any size) or flared (1/2-inch and smaller).

Part 3 - Execution

Installation

Under structures, use unbroken pipe lengths to avoid fittings whenever possible.

Runs shall be parallel and perpendicular with floors and walls unless positive drainage is required. When Owner allows soft copper for exposed pipe, straighten any curved or bent pipe for straight sections longer than 6-inches.

15.22.08 Brass/Bronze Pipe and Fittings

[CSI 33 05 12 or 40 05 12]

Part 1 - General

References

Brass to be low-lead content in compliance with NSF/ANSI 372 to have no more than 0.25 percent lead content.

Brass nipples: ASTM B687

Brass fittings: ANSI/ASME B16.15 (threaded) Class 125 lb. (up to 200 psi water), 250 lb. (up to 400 psi water); B16.18 (soldered).

Part 2 - Products

Materials

Brass pipe, nipples, and fittings to have threaded ends.

15.22.09 True Restrained Joint Pipe and Fittings

[CSI 33 05 09.33]

Part 1 - General

Related Sections

• Division 15.22.02 Ductile Iron Pipe and Fittings

Design Requirements

Ductile iron pipe shall have thickness designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressures to meet the requirements of Division 1.81.40.

Submittals

Submit layout drawings of all restrained sections.

Part 2 - Products

Manufactured Units

Fabricated Restrained Joint pipe (aka True Restrained Joint) shall be ductile iron manufactured in accordance with requirements of ANSI/AWWA C151/A21.51. Fabricated (True) Restrained Joint pipe shall be Griffin Pipe SnapLok, Pacific States Cast Iron Pipe Company Thrustlock, US Pipe TR-Flex, or approved equal.

Ductile Iron Fittings

Type of ends shall be specified as true restrained joint (TRJ) and be of the same brand and model as the adjoining pipe.

Finishes

For above grade and exposed pipes, including those inside structures, prepare surfaces and coat the exterior per specification Division 9.91.13.13.

Part 3 - Execution

Installation

Provide tools and equipment, including any special tools required for installing each particular type of pipe used.

Short lengths of TRJ pipe supplied by the manufacturer shall be used whenever possible to provide the proper spacing of valves, tees, or special fittings. After a restrained section has been assembled, the joints shall be extended to their full length prior to backfilling. The preferred method for TRJ pipe installation is to place the fitting or valve first, then lay TRJ pipe away from the fitting or valve. Any cuts necessary to close gaps shall be made on the adjoining standard push-on joint pipe, not on the restrained sections. Alternate methods for installation must be approved by the Owner. "Field Kits" will not be allowed unless prior approval is given by the Owner.

15.23 Non-Metal Pipe and Fittings

15.23.05 PVC Pipe and Fittings - Solvent Weld

[CSI 33 05 31.13 or 40 05 31.13]

Part 2 - Products

Materials

Polyvinyl chloride (PVC) material for pipe fittings and couplings shall conform to ASTM D-1784, Type 1, Grade 1, with 2,000 psi design stress. Pipe shall be Schedule 40 or 80 in accordance with ASTM D-1785, as shown on the Plans.

All pipe shall be white unless shown otherwise on the Plans.

Part 3 - Execution

Installation

For exposed locations that will not be painted, primer and glue must be applied carefully and not allowed to run. Areas where primer/glue has run more than ¹/₄-inch past the joint will be cleaned, painted, or replaced by the Contractor at the discretion of the Owner.

15.30 VALVES

15.31 Common Work for Valves

[CSI 40 05 51 or 33 14 19]

Part 1 – General

Design and Performance Requirements

Valves noted on the Plans or in other parts of the Specifications shall meet the requirements herein. Valves shall be designed for the intended service.

Valve suppliers shall review the design and certify that the valve provided in the submittal is appropriate for the application and will operate as shown and described. Any discrepancies from the design and the valves shall be brought to the Engineer's attention during the bidding process. Valves that do not operate as specified and per normal industry standards shall be replaced or modified so that they operate within the design parameters at the Contractor's expense.

Pressure rating shall be per Division 1.81.40 unless shown otherwise.

Part 2 – Products

Components

If shear pins are installed with any valve, the manufacturer shall certify the shear pin(s) to fail between 95 to 99 percent of the operator shaft failure torque. Provide concrete supports for operators where required, as shown on the Plans.

Buried valves shall be equipped with an AWWA 2-inch wrench nut with a minimum of 10 turns required to close the valve, unless otherwise noted on the Plans. Exposed valves shall be equipped with lever actuator for valves 2 inches and smaller, or handwheel actuator for valves 3 inches and larger, unless otherwise noted on Plans.

Buried valves where the operator nut is more than 3 feet below the valve box lid shall be provided with a solid shaft valve nut extension to reach between 18-inches and 30-inches of the ground surface. Extension shall attach to the nut with a set screw. Diameter of extension shall be appropriate for the valve size and length of extension, but under no circumstances shall be less than 1 inch for 4-foot-long extension rods, or 1.25 inch for rods longer than 4 feet. Extension shall function without excessive twisting.

Part 3 - Execution

Installation

Install valves in strict accordance with the manufacturer's instructions and as shown on the Plans. Verify alignment and adjustments after installation. Provide buried valves with all operators or valves boxes installed so that wrenches or operators perform freely and without binding or other interference. Bed and backfill buried valves according to the requirements of the pipe to which they are attached.

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15.32 Isolation Valves

15.32.04 Butterfly Valves Class 250

[CSI 40 05 64.17]

Part 1 – General

Design Requirements

Butterfly valves shall be tight-closing rubber seat type with a minimum 250 psi working pressure rating. Valves 3-inch and larger must meet or exceed the full requirements of AWWA Standard C504. Valves smaller than 3-inch shall be high performance valves specifically designed for shutoff and throttling control of liquids and gas. Valve components shall withstand an operator input torque of 400 foot-pounds without damage.

Part 2 – Products

Manufacturers

- M&H 4500 CL250
- Dezurik BHP
- Mueller LineSeal XP
- Pratt HP250

Manufactured Units

Three-inch and larger valve bodies shall be carbon steel or ductile iron. Provide valve disc constructed of stainless steel or ductile iron ASTM 536, Grade 65-45-12. The disc seating edge shall be solid stainless steel. Sprayed mating seat surfaces are not acceptable. Valves smaller than 3-inch shall have 316 stainless steel body and disc and shall be lug style. The seat shall be EPDM. Valve Buna-N, PTFE or bearings shall be sleeve-type of and corrosion-resistant. Valve bearings shall be of traveling nut type and shall open left.

Supply valves with the valve operator on the side of the valve shown on the Plans.

Provide fusion bonded epoxy or two-part liquid epoxy coating to all internal and external surfaces.

Part 3 – Execution

Installation

Install per manufacturer's instructions. When installing on thick wall pipe such as HDPE or C900 PVC, verify if there are any interferences with the valve disc and the pipe wall. If the disc does not operate freely, install valve spacers to provide clearance. Beveling the interior of the pipe will only be allowed if approved by the Engineer.

All butterfly valves shall be test-operated prior to burial in the presence of the Owner's representative to prove full open and closing capability. Testing procedure: Close the valve prior to applying test pressure. Do not operate the valve under test pressure. Bleed off pressure to below the working pressure rating prior to operating the valve.

15.32.05 Flow Control Valve

Part 1 – General

Design Requirements

Flow control valve shall be a triple eccentric butterfly valve with insert, Class 300 with a flow range of 500 gpm to 13,000 gpm. Valve components shall withstand an operator input torque of 1,800 foot-pounds without damage.

Part 2 – Products

Manufacturers

Acceptable manufacturers include:

• Yeary Controls

Manufactured Units

Flow control valve shall be Yeary Controls, Sharktooth Throttling Trim Cartridge inserted into a Yeary Controls Triple Eccentric Butterfly Valve. The valve trim type shall be Modified Sharktooth for a water application.

Part 3 – Execution

Installation

Install per manufacturer's instructions. A qualified manufacturer's representative shall certify installation of the actuator, provide start-up and testing services including any field adjustments required, and train District staff in the correct operation and maintenance of the valve. Valve shall be test-operated prior restoring service in the presence of the District's representative to prove full open and closing capability. Testing procedure: Close the valve prior to applying test pressure. Do not operate the valve under test pressure. Bleed off pressure to below the working pressure rating prior to operating the valve.

15.39 Valve Actuators

[CSI 40 05 57]

15.39.01 Common Work for Valve Actuators

15.39.02 Electric Motor Valve Actuator

Part 1 – General

Submittals

Actuator torque requirements for the application shall be sized by the manufacturer of the valves and gates for the design criteria for maximum flows and pressures. Minimum safety factor shall be at least 2 times the actual highest torque requirement calculated. Torque calculations shall be submitted with the valves. Manufacturer shall review wire sizing and provide corrections as needed.

Design Criteria

Actuator shall be capable of repeated operation of flow control valve specified in Division 15.32.05.

Part 2 – Products

Manufacturers

Acceptable manufacturers include:

• Auma Actuators

Manufactured Units

The motor shall be specifically designed for actuator service. The motor will be capable of operating on 480 volt - 3 phase - 60 hertz power. The motor will be induction type with class F insulation and protected by means of thermal switches imbedded in the motor windings.

Actuator enclosure shall be NEMA Type 6P.

All gearing shall be grease lubricated and designed to withstand full stall torque of the motor. All wiring shall be terminated at a plug and socket connector.

Actuator will be modulating, quarter-turn electric weatherproof actuator capable of operating in an ambient temperature range of -20 to +158 degrees F.

Components

Motor

• Motor Designation: VD0R071-4-0.12

Actuator

• SA Model: SAR10.2

Gearbox:

• GS Model: GS100.3

Actuator Controls:

• AUMATIC Version: AC 01.2

Actuators shall contain motor, gearing, manual over-ride, limit switches, torque switches, drive coupling, integral motor controls, position feedback transmitter (on modulating types) and mechanical dial position indicator.

Manual over-ride shall be by handwheel. Manual operation will be via power gearing to minimize required rimpull and facilitate easy change-over from motor to manual operation when actuator is under load. Return from manual to electric mode of operation will be automatic upon motor operation. A seized or inoperable motor shall not prevent manual operation.

Limit switches shall be furnished at each end of travel. Limit switch adjustment shall not be altered by manual operation. Limit switch drive shall be by countergear. Limit switches must be capable of quick adjustment requiring no more than five (5) turns of the limit switch

adjustment spindle. One set of normally open and one set of normally closed contacts will be furnished at each end of travel where indicated. Contacts shall be of silver and capable of reliably switching low voltage DC source from the control system furnished by others.

Mechanically operated torque switches shall be furnished at each end of travel. Torque switches will trip when the valve load exceeds the torque switch setting. The torque switch adjustment device must be calibrated directly in engineering units of torque.

Quarterturn actuators will be furnished with mechanical stops that restrict the valve/actuator travel.

Actuator must be capable of the following valve closing times/operating speeds: quarterturn valves - 60 second closing time.

Part 3 – Execution

Installation

Install per the manufacturer's instructions. A qualified manufacturer's representative shall certify installation of the actuator, provide start-up and testing services including any field adjustments required, and train District staff in the correct operation and maintenance.

15.40 PIPING SPECIALTIES

15.40.01 Dismantling Joint

[CSI 40 05 06.13]

Part 1 – General

Design Criteria

Dismantling joint shall be accessible and capable of repeated installations and removals and capable of the testing and working pressures as specified in Division 1.81.40. Joint adjustment range of no less than 2-inches for 12-inch diameter and smaller pipe, and 3-inches for 14-inch diameter and larger pipe. Joint assembly to include limiting rods to prevent pull-out.

Part 2 – Products

Manufacturers

Dismantling joint shall be Romac DJ400 with limit rods or equal.

Part 3 – Execution

Installation

Install per the manufacturer's instructions. Set the assembly at the midpoint of the adjustment range unless specifically called out otherwise on the Plans.

15.40.03 Pipe, Valve, and Conduit Supports

[CSI 40 05 07]

Part 1 - General

Summary

This section includes providing pipe supports, hangers, guides, and anchors.

Related Sections

- Division 1.81.30 Seismic Restraint
- Division 5.05.23 Bolts and other Connectors

References

Pipe supports furnished under this section shall comply in all respects with the requirements of the following standards.

•	ANSI/ASME B31.1	Power Piping
•	ANSI/MSS SP-58 Manufacture	Pipe Hangers and Supports - Materials, Design and

ANSI/MSS SP-69 Pipe Hangers and Supports - Selection and Application

Performance Standards

Piping systems, including connections to equipment, shall be properly supported to prevent deflection and stresses. Supports shall comply with ANSI/ASME B31.1, except as otherwise indicated.

Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

Support plumbing drainage and vents in accordance with the Uniform Plumbing Code.

Submittals

Pipe Hanger/Support Design Calculations

Shop drawings of engineered pipe hangers/supports, including details of concrete inserts. Drawings shall include location plan showing location of the hanger/support in relation to the structure and/or equipment.

Part 2 – Products

Manufacturers

Pipe supports, hangers, guides, and anchors shall be Anvil, Unistrut, Tolco, Standon, or equal.

Flange supports shall be equal to Standon Adjustable Model S89 Flange Support. Pipe supports shall be equal to Standon Adjustable Model S92 Pipe Support. Both flange and pipe supports shall be equal to those manufactured by Material Resources, Hillsboro, Oregon.

Components

Provide and install all equipment necessary for compete support systems including, but not limited to, base, riser pipe, anchor bolts, hanger rod, support cradle or clamp, and fasteners.

Except as otherwise noted, pipe support components shall comply with the types in ANSI/MSS SP-58.

Finishes

Unless otherwise noted, all fabricated pipe supports, other than stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM 123. Other than stainless steel and non-ferrous supports, supports shall be coated in accordance with Division 9.91.13.1.

Part 3 - Execution

Installation

Piping shall be rigidly anchored to walls, slabs, and ceilings by means of suitable pipe supports, wall brackets, or pipe hangers.

Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's installation instructions and ANSI/ASME B31.1. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

<u>Stand-on Pipe Support</u>: Adjust support, secure to pipe and secure to floor as recommended by the manufacturer.

<u>Support Spacing</u>: Pipe supports shall be placed to meet the following maximum spacing, unless otherwise noted or shown on the Plans: maximum vertical support spacing of 5 feet, and maximum horizontal support spacing of 10 feet. Support shall be provided at horizontal bends, base of risers (vertical bends), floor penetrations, connections to pumps, blowers, and other equipment, valves and appurtenances. Support spacing shall meet the local plumbing code where applicable. Support spacing may be increased from that noted above provided adequate calculations are provided supporting the change.

<u>Support Anchorage</u>: Concrete anchors shall be as specified in Division 3, Concrete Anchors. All channel strut type supports shall have a minimum of 2 anchors per support.

Suspend pipe hangers from hanger rods, secure with double nuts.

Securely anchor plastic pipe, valves and headers to prevent movement during operation of valves. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

Provide ductile iron elbows or tees supported from floors with base fittings. Support base fittings with metal supports, or when indicated on the Plans, concrete piers.

Do not use chains, plumbers' straps, wire, or similar devices for suspending, supporting or restraining pipes.

Install riser clamps at floor penetrations and where indicated on the Plans.

Field Quality Control

Pipe supports and hangers shall be positioned in such a way as to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other work.

Properly support, suspend or anchor exposed pipe, fittings, valves and appurtenances to prevent sagging, overstressing or movement of piping and to prevent thrusts or loads on or against connected pumps, blowers or other equipment.

15.40.04 Dielectric Fittings and Adapters

[CSI 40 05 06.17]

Part 3 - Execution

Installation

Provide dielectric adapters between dissimilar types of metal pipes, valves and fittings (e.g. copper to stainless steel). Flange isolating kits shall be used when dissimilar metal flanged pipe is connected. The following connections do NOT require dielectric isolators.

Metal	Connecting to
Bronze/brass	Copper or ductile iron
Ductile iron	Mild steel, bronze or brass

15.40.08 Valve Box – Cast Iron

[CSI 33 05 81.23]

Part 2 - Products

Components

Cast iron valve boxes shall be a complete unit composed of the following:

- Valve box
- Lid with recessed handle
- Extension stem for operator nuts more than 3 feet below grade

Valve box assembly shall be adjustable to accommodate variable trench depths. Valve box assembly shall be rated for continuous traffic loading.

Part 3 - Execution

Installation

Valve boxes shall be provided and installed for all buried valves. Install box plumb with surface and straight so that keys and operators do not bind.

15.40.12 Sacrificial Corrosion Control for Metal Pipe

[CSI 13 47 13.13]

Part 1 – General

Description

This work consists of requirements for corrosion control materials and construction methods for water system piping. Provide the corrosion control system specified herein for buried pipes. *Impressed current corrosion protection systems are not covered*.

Abbreviations

mdft - Mils Dry Film Thickness, referring to coating applications.

NACE - National Association of Corrosion Engineers

AMPP - Association for Materials Protection and Performance (previously NACE)

Definitions

Exothermic Welding and Pin Brazing - A specialized process used for electrical connections to the exterior of pipe and fittings.

Submittals

- 1. **Products** Provide submittals for all products referenced in this section.
- 2. **Testing** Submit written documentation of experience as a professional engineer regularly performing cathodic protection work or certification as an AMPP Cathodic Protection Specialist for all personnel performing field testing.
- 3. Test reports Submit 3 copies of all field test reports.

Part 2 - Materials

Exothermic Welds and Pin Brazing

Weld Materials

Molds, cartridges, and all required materials for exothermic (copper) welding shall be as produced by "Cadweld", Erico Products, Inc., or approved equal. Provide molds and cartridges of a size and material as recommended in writing by the manufacturer. Molds for exothermic welding shall be graphite; ceramic molds are not acceptable.

- 1. Ductile Iron Pipe For connection to ductile iron pipe, use "Cadweld" XF-19 alloy weld metal or approved equal.
- 2. Cast Iron Pipe For connection to cast iron pipe, use "Cadweld" XF-19 alloy weld metal or approved equal.
- 3. Steel Pipe For connection to steel pipe, use "Cadweld" F-33 alloy weld metal alloy or approved equal.

Terminals

All wires used with exothermic welds shall have formed sleeve terminals and shall be welded using the reduced weld size and special weld mold for formed terminals, as specified in writing by the manufacturer. The formed terminals may be factory fabricated or may be field formed using sleeves and a hammer die. Connections to mortar coated steel or concrete cylinder pipe shall be exothermically welded to a 1/2 inch diameter steel rod preinstalled on the pipe by the pipe manufacturer.

Pin Brazing

Pin Brazing - Pins, studs, lugs and ferrules shall be as recommended in writing by the manufacturer for the wire size, pipe material, and pin braze machine settings.

Weld Caps

Furnish weld caps of high-density plastic, 10 mils (minimum) thickness Handy Cap IP, as manufactured by Royston Laboratories, or approved equal. Provide caps that incorporate a dome for the weld, a tunnel to contain the lead wire from the weld connection, and a base plate to cover the prepared pipe surface. Weld caps shall be provided pre-filled with mastic/adhesive and have an integral primer for adhesion to the pipe or structure. Weld caps shall be sized for the exothermic or pin brazed connection.

Galvanic Anodes

Supply galvanic anodes of the quantity, composition, dimensions, metal weight, and packaged backfill as shown or noted on the drawings.

Magnesium Anodes

Provide magnesium anodes, nominal 20 inches long and nominal 30 pound bare metal weight. Magnesium anodes shall meet the requirements of ASTM B-843-M1C High Potential Magnesium Alloy and ASTM G97 with an open circuit potential of (-)1.7VDC to CSE and a current efficiency of 50%. The anodes shall be prepackaged in a permeable cloth bag containing the manufacturer's prescribed backfill and the packaged anode shall be a nominal of 2.5 times the bare anode weight. The anode lead wire shall be solid copper wire, AWG #12 or #10, with TW-, THHN-, or USE-type insulation, and the connection to the anode shall be silver soldered by the manufacturer and shall be of an un spliced length specific to the application but not less than 15 feet.

Test Stations and Coupons

Supply test stations of the quantity and type as shown or noted on the drawings.

Test Station

Flush-mounted test stations shall be cast iron valve boxes and cover for water.

Cathodic Protection Monitoring Coupons

Provide coupons, steel or ductile iron, to match the pipe material type. The coupon shall have 2 wires connected with a silver soldered potted connection, and with a minimum length of 10 feet. Provide MC Miller IR-Free coupons or approved equal. The coupon access drop tube shall be Schedule 40 PVC pipe, 2 inches in diameter.

Wire

Wire for test stations and joint bonds larger than AWG #10 shall be single-conductor, stranded copper, with USE-type insulation. Wire AWG #10 or smaller shall be solid not stranded, with TW-, THHN-, or USE-type insulation. Provide the wire size as specified or shown.

Insulation for Dielectric Isolation

Insulating Flange Joints

Flange insulation shall include a full face insulating gasket, a full-length insulating sleeve for each bolt, and two insulating washers and two steel bearing washers for each flange bolt.

- 1. Sleeves and Washers Insulating sleeves and washers shall be Pyrox G-10. Both the insulating washers and the steel washers shall fit over the outside diameter of the sleeve and shall fit within the bolt facing of the flange.
- 2. Gaskets Gaskets shall be full faced, Styrene Butadiene Rubber (SBR), Nitrile (Buna-N), Neoprene, polytetrafluoroethylene (PTFE), or compressed vegetable fiber. Gaskets shall have adequate dielectric properties, 200V/mil minimum, and shall be suitable for the operating and test pressures of the pipe system. Gaskets shall NSF-61 approved. No hard rigid gasket (e.g. phenolic or epoxy-fiberglass (G-10)), even if full-faced elastomeric coated (e.g. neoprene-coated phenolic) or with elastomeric sealing element such as an O-ring or flat band. For gaskets used at ductile iron pipe flange joints, provide American Toruseal Flange Gasket (yellow only) has sufficient dielectric characteristics to meet the 200V/mil minimum requirement.
- 3. Joint Assembly An insulating joint assembly shall consist of 2 flange by plain end or 2 flange by mechanical joint (FLG x PE or FLG x MJ) adapters, a full face insulating gasket, with full length insulating sleeves, 2 insulating washers, and 2 steel bearing washers for each flange bolt.

Insulating Wall Seals

Wall seals shall consist of compression disks and pressure plates made of dielectric materials. Insulating wall seals shall be Model C Insulating Type as manufactured by Link Seal or approved equal.

Polyethylene Encasement and Tape Wrap

Polyethylene Encasement for DI Pipe

Furnish 4 mil Type 2 high density cross laminated polyethylene film in accordance with AWWA C105 tube type encasement. Polyethylene sheet is not acceptable. Furnish polyethylene encasement from the same manufacturer that supplies the ductile iron pipe.

Miscellaneous

Stainless Steel

The exposed surface of stainless steel that is in contact with ductile iron shall be paint coated with a coal tar mastic or surface tolerant epoxy.

Part 3 - Execution

Exothermic Welding and Underground Electrical Connections

Unless otherwise specified, all electrical connections to the pipe shall be by exothermic welding or pin brazing. Properly cover exothermic or pin brazed welds with weld caps. Provide sufficient space between adjacent exothermic welds to install a full sized weld cap on each weld. Repair all damaged pipe coating in accordance with the manufacturer's recommendations. Prior to coating, test all exothermic or pin brazed welds by striking with a hammer in a manner approved by the professional engineer or specialist in cathodic protection.

Galvanic Anode Installation

Unless specified otherwise, install anodes 5 feet below the pipe invert, positioned under the pipe or up to 3 feet perpendicular from the pipe edge. Do not place the anodes within 3 feet of a neighboring metallic structure. When anodes are distributed along the pipeline, alternate the perpendicular offset from one side of the pipe to the other.

Location

Install the anode in clean, native backfill and not in the select bedding material. Locate anodes a minimum of 5 feet apart. Thoroughly soak the anode in water prior to installation. Compact the backfill to 95% of maximum density to 1 foot above the anode. Evenly distribute anodes along main and branch line installations. Anodes may be grouped at the ends of casings and short runs of pipe; maintain 5-foot minimum distance between anodes.

Connection

The anode lead wire shall be exothermically welded to the pipe. Alternatively, the anode shall be connected to a joint bonding wire by using a split-bolt connection. Distances between anodes are nominal lengths and anode connections shall be made at pipe joints. Unless otherwise specified, for ductile iron water mains and steel pipe and casings, provide anodes as shown.

Test Station Installation

Locate test stations as follows.

Isolation Joint Test Stations (TSIJ)

Provide a test station at all buried insulated flanges and insulating couplings, except insulated connections on copper services. Provide a test station at the dielectric isolation between mortar coated steel or CCP lines and dielectrically isolated branch lines, unless the Engineer elects to not install test stations at these locations. Insulating Joint Test stations shall have (2) AWG #8 wires welded to each side of the dielectric joint, (4) wires total.

Monitoring Test Stations (TSM)

Provide a monitoring test station with cathodic protection monitoring coupons where water mains cross cathodically protected foreign lines and where water mains cross electric rail tracks. Monitoring Test Stations shall have (2) AWG #8 wires welded to the main, and (2) cathodic protection monitoring coupons, each with (2) AWG #12 wires, (6) wires total.

Combination Test Stations (TSC/IJ)

When (2) or more test stations on the same pipe are adjacent to each other (within 15 feet) they may be combined and the test wires run to a single flush mounted test station. A TSIJ near the end of a casing may be combined with the TSC into a single test station with (2) AWG #8 wires to the casing, (2) AWG #8 wires to the casing side of the dielectric joint and (2) AWG #8 wires to the far side of the dielectric joint, (6) wires total. A TSM can be included in the combined test station by providing (2) cathodic protection monitoring coupons without additional wires to the pipe or casing.

Dielectric Isolation

Provide pipe isolation with insulating flange joints, or insulating flexible couplings. Insulating joints shall be separate assemblies and not incorporated into joints with valves or other appurtenances with the exception of branch lines connected to Mortar Coated Steel Pipe (MCSP) or Concrete Cylinder Pipe. Where a branch line connects to a flange integral with a section of MCSP or CCP, a separate assembly is not required. Copper services shall be isolated with meter stops designed with integral insulation. Use insulating wall seals at all concrete wall penetrations.

Insulating Joints

Mechanical joint assemblies of flange coupling adapters may be assembled above grade complete with attached test wires. Tape the flange edge of insulating joints with PVC tape to prevent particle bridging across the flange faces. Insulating flexible couplings shall have an insulating boot on each pipe end. Reducing insulating flexible couplings shall have a boot on one pipe end and restraining bolts on the other. Transition couplings are not acceptable. Use reducing couplings to accommodate differing pipe size. Joint restraint at flexible couplings shall only use hot-dip galvanized rod and nuts and shall be insulated from the non-cathodically protected side of a joint, or insulated from the mortar coated side of a joint, or insulated on one side of the joint if both sides are cathodically protected.

Polyethylene Encasement Sleeve Wrapped and Tape Wrapped

Polyethylene Encasement Installation

Install polyethylene encasement, tube type, on all ductile iron pipe and appurtenances where shown or specified. Install one length of polyethylene tube encasement for each length of pipe in accordance with AWWA C105, Method A. Every 6 feet along the pipe, secure the polyethylene tube encasement with tape full circumference. The use of polyethylene sheets will not be allowed.

Install 40 mil geo-membrane around mechanical joints and similar connections where the polyethylene can be punctured or ripped. Tape the ends and seams of the geo-membrane with PVC tape and then cover the pipe joint with the adjoining polyethylene encasement.

Tape Wrapped Coating for Casings

Apply tape wrapped coating on steel casing pipe in accordance with AWWA C203, AWWA C214, AWWA C216 for manufacturer applied tape wrap and AWWA C209 for minor field applications. For tape wrapped coating repairs and other coating holdback areas, apply repair

tape system per manufacturer's requirements. Apply petrolatum wax tape per AWWA C217 with outer wrap only where directed.

Testing and Verification

Quality Assurance

The portion of the work that involves the installation and testing of the galvanic cathodic protection system shall be conducted by a professional engineer regularly performing cathodic protection work or by an individual who is registered or certified by the National Association of Corrosion Engineers (NACE) as a cathodic protection specialist. Submit verification of registration or certification for written approval prior to the start of the work.

Field Verifications

The professional engineer or specialist in cathodic protection shall field verify the adequacy of the Contractor's personnel in handling and placing anodes and monitoring coupons, performing exothermic welding, installing split bolt connectors, repairing coatings including weld caps, and measuring dielectric isolation and bonding.

The professional engineer or specialist in cathodic protection shall at the start of the work provide a list of qualified Contractor personnel and only these listed individuals shall perform such work for the Contractor.

Testing During Construction

Test all isolation joints after installation and prior to backfilling.

Continuity and Isolation Testing

Perform testing as follows:

- 1. General Test all sections of pipeline and appurtenances that are cathodically protected and dielectrically isolated for electrical continuity and dielectric isolation after all Contractor connections have been made.
- 2. Test Current Response Measure the response of the pipe to the application of cathodic protection test current. If the application of the test current causes the pipe-to-soil potential to become more negative, electrical continuity of the pipeline, service runs, and appurtenances is indicated between that point and the point at which the test rectifier negative connection was made. The response of the potential shall be of a magnitude to demonstrate low resistance joint bonds. Electrical isolation across insulating fittings shall be indicated by the pipe-to-soil potential being more positive or only slightly negative in relation to the structure connected to the test rectifier.

Lack of Continuity or Isolation

If electrical continuity or electrical isolation is not achieved, locate the deficiency and complete the necessary repairs. The Contractor's corrosion control specialist shall retest the system before final acceptance.

Repairs

Make all repairs necessary to correct any deficiencies and repair any joint not passing the electrical continuity or isolation test at no cost to the City.

Final System Testing

Final system testing shall be performed prior to the hydrostatic testing of each segment and prior to the substantial completion. Final testing shall be performed directly by the professional engineer or specialist in cathodic protection and witnessed by the Owner and shall include the following as a minimum:

- 1. Test and Service Locations Provide pipe-to-soil potential measurements for all test stations and for all service connections. Include date of measurement taken.
- 2. Continuity and Isolation Measurements Provide a report consisting of continuity and isolation measurements and other data for all cathodically protected sections of pipe, appurtenances, and for all service connections.
- 3. Documentation Provide 3 copies of a report documenting all testing and installation of cathodic protection system. The cathodic protection specialist shall sign the report. Include the specialist's NACE registration or certification number.

Warranty

A 2-year warranty period specified in the Contract shall apply to the entire corrosion control system installed.

15.51 Flow Meter Readout Head

[CSI 33 09 01, 33 19 90 or 40 71 90]

15.51.05 Digital Read Head with Electronic Output

[CSI 33 09 01.33, 33 19 94 or 40 71 94]

Part 2 - Products

Components

The totalizer shall read in units of hundreds of gallons.

Readout shall gallons per minute (gpm) for instantaneous flow.

The current output shall be a 4-20 mA signal that represents the rate of flow through the meter. Scale the transmitter as follows: 0 gpm minimum and 20,000 gpm maximum. The current output shall be plus or minus 0.5 percent of full scale of the instrument the transmitter is controlling.

Transmitter electronics shall consist of easily accessible printed circuit boards for convenient maintenance in a wall mountable NEMA 4X (standard) enclosure and connected to the transducer by cable. The meter manufacturer shall supply an unspliced cable run from the transmitter to the meter tube.

Provide an enclosure with window, that does not negate the enclosure NEMA rating, for viewing the flow rate and totalizing counter on an LCD readout. The transmitter shall display flow rate in gallons per minute, totalized gallons, and an empty pipe indicator.

The electronics shall be NEMA 4X rated. Output shall be 4-20 mA into 800 Ohms with an isolated ground and non-interacting zero and span adjustments. Separate 24 VDC pulse

outputs for forward flow shall also be provided. The display and output shall be user scalable for GPM, CFS, or MGD, and shall be password protected. All software shall be battery powered with a battery that has a 10-year service life.

The meter, electronics, and transmitter shall be RFI shielded to prevent interference from adjacent high noise electrical equipment such as variable frequency drives, electromagnetic starters, transformers, or transfer switches.

Provide the necessary interface between remote instrumentation and the transmitter. Provide a meter with power and signal wiring as recommended by the manufacturer. Ground instrumentation shall be as recommended by the manufacturer.

Part 3 - Execution

Installation

Connect outputs to telemetry or data logging system.

Install the remote readout head where shown on the Plans. If not shown on the Plans, confirm location with Engineer prior to installation.

15.53 Electronic Flow Meters

15.53.03 Electromagnetic Flow Meters

[CSI 33 19 23 or 40 71 13.13]

Part 1 - General

Related Sections

• 15.51.05 Digital Read Head with Electronic Output

Design Requirements

Provide an electromagnetic flow metering system suitable for measuring and transmitting flow rate in a full-flowing pipe. The meter shall be suitable for either horizontal or vertical mounting. The system shall operate within the accuracy required over an ambient temperature range of -10 to +120 degrees Fahrenheit and a process temperature range of +15 to +120 degrees Fahrenheit.

Part 2 - Products

Manufacturers

The flow meter shall be Endress and Hauser Proline Promag W 300 model 5W3B4F-1ME8/0 or approved equal. Sizes shall be as shown on the plans. Contractor shall provide signal and excitation cable as necessary for a complete operational meter. A spare flanged pipe spool matching the meter dimensions shall also be provided and placed in the meter vault. Flowmeter input power shall be voltage shown on Plans.

Manufactured Units

The flow meter system shall be microprocessor based, utilizing a DC bipolar pulsed coil that automatically re-zeroes after each pulse cycle. System accuracy shall be ± 1 percent of actual

flow rate over a fluid velocity range of 1 to 30 feet per second (fps), and within 0.01 fps for velocities less than 1 fps. Repeatability shall be 0.1 percent of full scale or better. System accuracy shall be traceable to NIST using prototype meters of the same configuration.

The meter tube and coil shall be mounted on the pipe between ANSI B16 pipe flanges and rated for working and test pressures as indicated in Division 1.81.40. The meter tube shall be 304 or 316 stainless steel. The meter and cable connection(s) shall be capable of complete submergence without damage. The meter shall include integral grounding electrodes, or 316 stainless steel grounding rings for installation at the inlet. The manufacturer shall verify that the grounding system is appropriate for the proposed use. All wetted parts shall be 316 stainless steel.

Finishes

The meter liner shall completely encapsulate all wetted areas except for electrodes. The liner shall be certified by the manufacturer as appropriate for the proposed use. The liner shall be Hard Rubber, Polyurethane, PTFE (drinking water / wastewater).

The meter supplier shall review the liner material specified and confirm that it is appropriate for this project fluid and process. Provide submittal information that the liner material is fully compatible with the liquid it is carrying.

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16.00 GENERAL

The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and specifications.

Sections in these specifications titled "*Common Work for*..." shall apply to all following sections whether directly referenced or not.

The Contractor shall reference Division 1.25 regarding substitutes and "or-equals".

16.05 Common Work for Electrical

[CSI 26 05 00]

Part 1 - General

Summary

Plans are diagrammatic and indicate general arrangements of systems and equipment, except when specifically, dimensioned or detailed. The intention of the plans is to show size, capacity, approximated location, direction and general relationship of one work phase to another, but not exact detail or arrangement.

Regulatory Requirements

The Contractor shall coordinate and provide all permits, licenses, approvals, inspections by the authority having jurisdiction and other arrangements for work on this project and all fees shall be paid for by the Contractor. The Contractor shall include these fees in the bid price.

Related Sections

See the following sections for items that may be provided and/or installed with other electrical equipment.

- Division 15.30 Valves
- Division 15.51 Flow meter transmitters

Codes and Standards

Provide all electrical work in accordance with latest edition of National Electrical Code, National Electrical Safety Code, Washington State Electrical, and local ordinances. If any conflict occurs between government adopted code rules and these specifications, the codes are to govern. All electrical products shall bear a label from a certified testing laboratory recognized by the State of Washington. Recognized labels in the State of Washington are UL, ETL, and CSA-US.

Definitions

Dry Locations: All those indoor areas which do not fall within the definitions below for wet, damp, or corrosive locations and which are not otherwise designated on the Plans.

Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Plans.

Damp Locations: All spaces wholly or partially underground, or having a wall or ceiling forming part of a channel or tank unless otherwise designated on the Plans.

The words "plans" and "drawings" are used interchangeably in this specification and in all cases shall be interpreted to mean "Plans".

The word "provide" shall be interpreted to mean furnish and install.

Design Requirements

Unless otherwise noted, provide enclosures as follows:

- 1. Indoors Unclassified Locations: NEMA Type 12
- 2. Electrical Rooms: NEMA Type 1

Submittals

Provide submittals of each item specified in this division to engineer for approval in accordance with Division 1 of these specifications. Submittals for motor control centers, motor control panels, control panels, instrumentation panels, and pump control panels shall include at a minimum: a wiring diagram or connection schematic, and an interconnection diagram.

Wiring Diagram or Connection Schematic

1. Include all devices in a system and show their physical relationship to each other including terminals and interconnecting wiring in assembly. This diagram shall be in a form showing interconnecting wiring only by terminal designations (wireless diagram).

Interconnection Diagram

1. Show all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. Show references to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Show bundled wires on a single line with the direction of entry/exit of the individual wires clearly shown. Identify all devices and equipment. Show terminal blocks as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Show spare wires and cables.

Provide submittal information for the following items:

- 1. Distribution Transformers
- 2. Branch Circuit Panelboard
- 3. Circuit Breakers
- 4. Conduit and Fittings
- 5. Outlet and Junction Boxes

- 6. Wire and Cables
- 7. Switches and Receptacles
- 8. Light Fixtures
- 9. Other Electrical Components listed in this Division and/or required by the Engineer.

Project Conditions

Contractor shall keep all power shutdown periods to a minimum. Carry out shutdowns only after a shutdown schedule has been submitted and approved by both the Owner and the Engineer.

Construction Power

See Division 1.51

Part 2 - Products

Source Quality Control

Provide adequate space and fit for the electrical installation, including, but not limited to, determination of access-ways and doorways, shipping sections, wall and floor space, and space occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the Plans. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with National Electric Code (NEC) and shall be installed in locations which will provide adequate cooling.

Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions unless approved by the Owner.

Identification of Listed Products

Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the inspection authority may require the product to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.

Materials

Use equipment, materials and wiring methods suitable for the types of locations in which they will be located, as defined in Definitions above.

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

Components

Fasteners for securing equipment to walls, floors, and the like shall be either hot-dip galvanized after fabrication or stainless steel. Provide stainless steel fasteners in corrosive locations. When fastening to existing walls, floors, and the like, provide capsule anchors, not expansion shields. Size capsule anchors to meet load requirements. Minimum size capsule anchor bolt is ³/₈-inch.

Accessories

Wire Identification

1. Identify each wire or cable at each termination and in each pull-box using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as approved by the Engineer. Identify each wire or cable in each pull-box with plastic sleeves having permanent markings. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Finishes

Refer to each electrical equipment section of these specifications for painting requirements of equipment enclosures.

Part 3 - Execution

Installation

General

- 1. Complete the wiring, connection, adjustment, calibration, testing and operation of mechanical equipment having electrical motors and/or built-in or furnished electrical components in accordance with electrical code, UL listing requirements and manufacturer's instructions. Install electrical components that are furnished with mechanical equipment.
- 2. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
- 3. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components accessories and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified properly functional.

Workmanship

- 1. Assign a qualified representative who shall supervise the electrical construction work from beginning to completion and final acceptance.
- 2. Provide all labor using qualified craftsmen, who have had experience on similar projects.
- 3. Ensure that all equipment and materials fit properly in their installations.

Field Services

1. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up and operation of the equipment, and to correct any problems which occur during testing and start-up.

Installing Equipment

- 1. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
- 2. Install all floor-mounted equipment on $3^{1/2}$ -inch high reinforced concrete pads.
- 3. Install all equipment and junction boxes to permit easy access for normal maintenance.

Cutting, Drilling, and Welding

- 1. Provide any cutting, drilling, and welding that is required for the electrical construction work.
- 2. Structural members shall not be cut or drilled, except when approved by the Engineer. Use a core drill wherever it is necessary to drill through concrete or masonry. Perform patch work with the same materials as the surrounding area and finish to match.

<u>Metal Panels</u>

1. Mount all metal panels, which are mounted on, or abutting concrete walls in damp locations or any outside walls ¹/₄-inch from the wall and paint the back side of the panels with a high build epoxy primer with the exception of stainless-steel panels. Film thickness shall be 10 Mils minimum.

Load Balance

- 1. Balance electrical load between phases as nearly as possible on panelboards, motor control centers, and other equipment where balancing is required.
- 2. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

Field Quality Control

Minor Deviations

- 1. The electrical plans are diagrammatic in nature and the location of devices, fixtures, and equipment is approximate unless dimensioned. Based on this, the right is reserved by the owner to provide for minor adjustments and deviations from the locations shown on the Plans without any extra cost. Deviations from the Plans and/or specifications required by code shall also be done, subsequent to Owner's approval, without extra cost.
- 2. Plans indicate the general location and number of the electrical equipment items. When raceway, boxes, and ground connections are shown, they are shown diagrammatically only and indicate the general character and approximate location. Layout does not necessarily show the total number of raceways or boxes for the circuits required. Furnish, install, and place in satisfactory condition all raceways, boxes, conductors, and connections, and all of the materials required for the electrical systems shown or noted in the contract documents complete, fully operational, and fully tested upon the completion of the project.

Project Record Plans

1. A set of Plans shall be maintained at the job site showing any deviations in the electrical systems from the original design. A set of electrical Plans, marked in red to indicate the

routing of concealed conduit runs and any deviations from the original design, shall be submitted to the Owner for review prior to final acceptance.

2. After testing and acceptance of the project the Contractor shall furnish in the O&M manuals an accurate connection schematic and interconnection diagram for every service entrance panel, pump control panel, motor control center, and instrumentation panel provided this project.

Cleanup and Equipment Protection

Equipment Protection

1. Always exercise care after installation of equipment, motor control centers, control panels, etc., to keep out foreign matter, dust debris, and moisture. Use protective sheet metal covers, canvas, heat lamps, etc., as needed to ensure equipment protection.

Cleaning Equipment

1. Thoroughly clean all soiled surfaces of installed equipment and materials upon completion of the project. Clean out and vacuum all construction debris from the bottom of all equipment enclosures.

Painting

1. Repaint any electrical equipment or materials scratched or marred in shipment or installation, using paint furnished by the equipment manufacturer.

Final Cleanup

- 1. Upon completion of the electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean and acceptable to the Owner.
- 2. Lamps and fluorescent tubes shall be cleaned, and defective units replaced at the time of final acceptance.

16.10 ELECTRICAL SITE WORK

16.10.1 Common Work for Electrical Site Work

[CSI 33 71 19]

Part 1 – General

Summary

The work included in this section consists of furnishing and installing conduit, fittings, handholes, pull vaults, warning tape, cables, wires, and related items, complete as specified herein and as indicated on the Plans for a complete and functional underground electrical system. Special vaults, grounding, trench backfill requirements may be specified with the particular equipment or electrical system involved.

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Related Sections

Wire and cable per Section 16.60.

Raceways and conduit per Section 16.70.

Design Requirements

Materials and equipment shall conform to the respective specifications and standards; and to be the specifications herein. Electrical rating shall be as indicated on Plans.

Part 3 – Execution

Construction

Provide all excavation, trenching, backfill, and surface restoration required for the electrical work.

Excavate to depths as required by Code, particular installation, or as shown on the Plans. Trench width and length as required by the installation or as shown. Trench bottom shall be free of debris and graded smooth. Where trench bottom is rock or rocky or contains debris larger than 1 inch or material with sharp edges, over excavate 3 inches and fill with 3 inches of sand. Separation between new electrical utilities and other utilities shall be 12 inches horizontal and 6 inches vertical minimum, except gas line separation shall be 12 inches both vertical and horizontal. Cross concrete or asphalt only after surface material has been saw cut to required width and removed.

Backfill around raceways shall be 3-inches of pea gravel or sand for systems of 600 volt or less. Provide red marker tape over raceways below grade. Place backfill material to obtain a minimum degree of compaction of 95 percent of maximum density at optimum moisture content. Moisten backfill material as required to obtain proper compaction. Do not use broken pavement, concrete, sod, roots or debris for backfill.

16.10.2 Underground Marking Tape (Detectable Type)

[CSI 33 05 97.23]

Part 2 – Products

Manufacturers

Tape shall be Brady "Detectable Identoline – Buried Underground Tape", or equal.

Materials

Underground marking tape shall be for location and early warning protection of buried power and communication lines. Tape shall be detectable by a pipe/cable locator or metal detector from above the undisturbed ground. Tape shall be nominally 2 inches wide with a type B721 aluminum foil core laminated between two layers of 5 Mil thickness polyester plastic. The plastic color shall be red for electrical lines and orange for telephone lines.

Part 3 – Execution

Installation

Unless noted otherwise on Plans, install approved underground marking tape 12 inches above and directly over the conduit or raceway in all trenches.

16.15 Grounding and Bonding for Electrical Systems

[CSI 26 05 26]

Part 1 - General

References

Service and equipment grounding shall be per Article 250 of the NEC.

Performance Requirements

Verify that a low-resistance ground path is provided for all circuits so an accidental contact to ground of any live conductor will instantly trip the circuit.

Part 2 - Products

Components

The grounding systems shall consist of the ground rods, grounding conductors, ground bus, ground fittings and clamps, and bonding conductors to water piping and structural steel as shown on the Plans.

System components shall be as allowed in the NEC unless specified otherwise below:

- 1. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods conforming to ASTM B228. The welded copper encased steel rod shall have a conductivity of not less than 27 percent of pure copper.
- 2. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded. Coat all ground connections except the exothermic welds with electrical joint compound, non-petroleum type, UL listed for copper and aluminum applications.
- 3. Ground Rod Boxes: Boxes shall be a 9-inch diameter precast concrete unit with hot-dip galvanized traffic cover. Boxes shall be 12-inches deep minimum. Covers shall be embossed with the wording "Ground Rod".

Part 3 - Execution

General Grounding Installation

When available a UFER ground per latest edition of NEC shall be provided as the primary means to ground the electrical system.

Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

Provide a ground rod box for each ground rod to permit ready access to facilitate testing.

Provide a ground wire in every conduit carrying a circuit of over 110 volts to ground.

Make embedded or buried ground connections, taps and splices with exothermic welds. Coat ground connections.

Bond metallic water piping at its entrance into each building.

Vault and Handhole Grounding

Exposed noncurrent-carrying metal parts of equipment, conductor supports or racks, conduits, and other metal appurtenances, including any metal cover and its supporting ring, shall be bonded together and connected to a common ground. The size of the grounding means shall be as prescribed in the NEC. Where the grounding means is exposed, the grounding conductor shall be not smaller than #8 AWG copper.

Ground Connections

Above grade ground connections shall be exothermic weld, mechanical, or compression-type connectors; or brazing.

Below grade ground connections shall be exothermic weld.

Install all ground connections is strict accordance with connector manufacturer's recommendations and methods.

Testing

Following completion of the grounding electrode system, if installed, measure ground resistance at each ground rod using the three-rod method. Submit results to engineer prior to final acceptance by the Owner.

Perform testing per NETA Standard ATS paragraph 7.13. Testing methods shall conform to NETA Standard ATS using the three-electrode method for large systems. Conduct tests only after a period of not less than 48 hours of dry weather.

Furnish to the Engineer a test report with recorded data of each ground rod location. See Division 16.95.4.

16.50 PANELBOARDS

[CSI 26 24 00]

16.52 Panelboards

[CSI 26 24 16]

Part 1 - General

Description of Work

This section covers the furnishing and installation of all panelboard equipment complete.

Quality Assurance

Provide products specified in this Section that are listed and labeled as defined in NEC Article 100.

Standards and Codes

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

All material and equipment specified herein shall conform with all applicable NEMA, ANSI, and IEEE standards.

All materials and equipment specified herein, and their installation methods shall conform to the latest published version of the NEC.

Part 2 – Products

Manufacturers

Materials, equipment, and accessories specified in this section shall be products of:

- Eaton/Cutler-Hammer
- Schneider Electric/Square D Company
- Siemens

Panelboards shall be of the same manufacturer as equipment furnished under Section 16.50, Low Voltage Motor Control.

Components

Panelboard Type

1. Panelboards shall be rated at proper voltage and current for intended use with bus bars of copper. Panels shall be 3-phase, 4-wire, 100 percent neutral, with equipment ground bar unless noted otherwise. Panelboards shall be dead front.

Wire Terminations

1. Panelboard assemblies, including protective devices, shall be suitable for use with 75 degrees Celsius or greater wire insulation systems at NEC 7 degrees Celsius conductor ampacity in accordance with UL 486E.

Load Current Ratings

- 1. Unless otherwise indicated, load current ratings for panelboard assemblies, including bus and circuit breakers, are non-continuous as defined by NEC. Continuous rating shall be 80 percent of non-continuous rating.
- 2. Where indicated "continuous", "100 percent", etc., selected components and protective devices shall be rated for continuous load value shown.
- 3. The following interrupting capacity shall be considered minimum. Other ratings shall be as specified on the Plans.

240V and 208Y/120V Panelboards	22,000 AIC symmetrical
480V/277V Panelboards	40,000 AIC symmetrical

Overcurrent Protective Devices

- 1. In accordance with NEMA AB 1, NEMA KS 1, UL 98 and UL 489, protective devices shall be adapted to panelboard installation.
- 2. Panelboards shall be capable of device replacement without disturbing adjacent devices and without removing main bus.
- 3. Spare Spaces: Cover openings with easily removable cover.
- 4. When not identified on Plans, provide minimum of 18 single-pole breaker spaces.

Circuit Breakers

- 1. Provide thermal-magnetic unless otherwise indicated, quick-make, quick-break, molded case, of indicating type showing ON/OFF and TRIPPED positions of operating handle. Mount breakers in all panelboards so that the breaker handles operate in a horizontal plan.
- 2. The bus connection shall be bolt-on circuit breakers in all panelboards. In power distribution panelboards, 225-ampere frame sizes and greater may be plug-in type where individual positive locking device requires mechanical release for removal.
- 3. Trip Mechanism:
 - a) Individual permanent thermal and magnetic trip elements in each pole.
 - b) Test button on cover.
 - c) Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
 - d) Two and three pole breakers shall have common trip.
 - e) Automatic opens all poles when overcurrent occurs on one pole.
 - f) Calibrated for 40 degrees C ambient, unless shown otherwise.

Ground Fault Circuit Interrupter (GFCI)

- 1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 5-mA ground fault with 0.025 second (UL 943, class A sensitivity, for protection for personnel).
- 2. Ground fault sensor shall be rated same as circuit breaker.
- 3. GFCI shall have a push-to-test button and a reset button.

Equipment Ground Fault Interrupter (EGFI)

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 30-mA ground fault (UL listed for equipment ground fault protection).

Cabinets for Each Panelboard

1. Cabinets shall be flush, or surface mounted as indicated on the Plans with tight closing doors without play when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of the same height.

- 2. Provide cabinets of sufficient dimensions to allow for future expansion and addition of circuit breakers within the panelboards as indicated on the Plans.
- 3. Provide locks for each cabinet door. All electrical distribution equipment locks are to be keyed identically.
- 4. Fasten panelboard with machine screws with oval countersunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps assessable only when dead front door is open are acceptable. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall have trim hinged at the right side in addition to the hinged door over dead front.
- 5. Material for Type 1, Type 3R, and Type 3S cabinets shall be code-gauge, hot-dip galvanized sheet steel with reinforced steel frame.
- 6. Finish all enclosures with rust inhibitor primer followed by manufacturer's standard gray baked enamel or lacquer.

<u>Bus</u>

1. Material for internal bus shall be full size copper throughout length. Provide for mounting of future protective devices along full length of bus regardless of number of units and spaces shown. Machine, drill and tap as required for current and future positions.

Feeder Lugs

1. Main and neutral feeder lugs shall be replaceable, bolted mechanical or crimp compression type.

Equipment Ground Terminal Bus

- 1. Provide copper equipment ground terminal bus with suitably sized provisions for termination of ground conductors. The terminal bus shall be bonded to the enclosure.
- 2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
- 3. Provide individual termination points for all other grounding conductors such as feeder, grounding electrodes, etc.

Neutral Terminal Bus

- 1. Provide copper neutral terminal bus with suitably sized provisions for termination of neutral conductors. The neutral bus shall be isolated from the enclosure.
- 2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
- 3. Provide individual termination points for all other neutral conductors.
- 4. Termination points shall be bolted crimp compression lugs for conductors 6 AWG or larger.

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Part 3 – Execution

General

Install in accordance with NECA 407, NEMP PB 1.2 and manufacturers' written installation instructions.

Installation

Install securely, plumb, in-line and square with walls.

Install top of panelboard trim 72 inches above floor, unless otherwise shown. Install panelboard so tops of protective device operating handles are no more than 72 inches above the floor.

Install filler plates in unused spaces.

System of Numbering and Bus Arrangement

System numbering and bus arrangement shall be as shown on the panel schedule on the Plans.

Panelboard Nameplate

Provide engraved plastic nameplate with ½-inch high characters for panel identifications (for panel name) attached with screws to each panelboard front. Include voltage, phase and wire (i.e., 208Y/120, 3-phase, 4-wire) in 3/8-inch characters.

Circuit Index

Provide as-built information for each branch circuit panelboard by circuit with its proper load designation.

Ground Fault Protection

Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289.

16.55 Switches and Protective Devices

[CSI 26 18 00 (medium voltage) 26 28 00 (low voltage)]

16.55.1 Common Work for Switches and Protective Devices

[CSI 26 18 05, 26 28 05]

Part 1 - General

Design Requirements

Overcurrent devices shall be NEMA rated.

Extra Materials

Provide one fuse for each ungrounded conductor and a minimum of one spare fuse per phase of each ampacity and voltage used on the project. Deliver fuses to Owner at the completion of the project.

Part 3 – Execution

Installation

Overcurrent protection devices and safety switches shall be centered 60 inches above the finished floor unless noted otherwise on the Plans.

16.55.16 Molded Case Circuit Breakers

[CSI 26 28 16.14]

Part 1 - General

Design Requirements

Breakers shall have the interrupting rating and trip rating indicated on the Plans. All breakers shall be calibrated for operation in an ambient temperature of 40 degrees Celsius.

Part 2 - Products

Manufactured Units

Molded case circuit breakers shall be quick-make and quick-break type with wiping type contacts. Each breaker shall be provided with arc chutes and individual trip mechanisms on each pole consisting of both thermal and magnetic trip elements. Two and three pole breakers shall be common trip. Molded case circuit breakers shall be trip-free. Each breaker shall have trip indication independent of the "ON" or "OFF" positions.

16.60 CONDUCTORS

16.61 Low Voltage Wire and Cable

[CSI 26 05 19]

Part 1 - General

Design Requirements

This section is for power and control conductors for 600 volts or less.

All conductors shall be copper. Wire or cable not shown on the Plans or specified, but required, shall be of the type and size required for the application and in conformance with the applicable code.

Part 2 - Products

Materials

Conductors

- 1. Solid and stranded copper wire shall be 600-volt Type THW, THWN, or THHW, Class B stranding, sizes #14 AWG, #12 AWG, and #10 AWG only. Use of THHN insulation shall not be allowed. Aluminum conductors shall not be allowed.
- 2. Stranded copper wire shall be 600-volt Type XHHW, Class B stranding, sizes #8 AWG and larger. Aluminum conductors shall not be allowed.
Splices

- 1. For Lighting Systems and Power Outlets: Wire nuts shall be twist-on type insulated connectors utilizing an outer insulating cover and a means for connecting and holding the conductors firmly.
- 2. All Equipment: Crimp type connectors shall be insulated type, suitable for the size and material of the wires and the number of wires to be spliced and for use with either solid or stranded conductors.
- 3. Division 16 Equipment and Power Conductors: Bolted pressure connectors shall be suitable for the size and material of the conductors to be spliced.
- 4. All Equipment: Epoxy splice kits shall include epoxy resin, hardener, mold, and shall be suitable for use in wet and hazardous locations.

Terminations

- 1. Crimp type terminals shall be self-insulating sleeve type, with ring or rectangular type tongue, suitable for the size and material of the wire to be terminated, and for use with either solid or stranded conductors.
- 2. Terminal lugs shall be split bolt or bolted split sleeve type in which the bolt or set screw does not bear directly on the conductor.
- 3. Wire Markers shall be plastic sleeve type. Wire numbers shall be permanently imprinted on the markers.

Finishes

Color Coding: Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. An isolated ground conductor shall be identified with an orange tracer in the green body. Ungrounded conductor colors shall be as follows:

- 1. 120/208 Volt, 3 Phase: Red, black and blue.
- 2. 277/480 Volt, 3 Phase: Yellow, brown and orange.
- 3. 120/240 Volt, 1 Phase: Red and black.

Part 3 – Execution

Location (Installment) Schedule

Provide the following conductors for the following applications:

- 1. Use stranded copper conductors for all power and control circuits unless noted otherwise on plans or below. Size as noted on the Plans.
- 2. Contractor may use solid copper conductors for lighting and receptacle circuits using screw-type terminals. Size as noted on the Plans.

16-15

3. Size #14 AWG wire or smaller shall not be allowed on power circuits.

Installation

Conductor Splices

- 1. Splices: Install all conductors without splices unless necessary for installation, as determined by the Engineer. Splices when permitted shall be completed using an approved splice kit intended for the type of conductor and the application. The splice shall be in accordance with the splice kit manufacturer's instructions.
- 2. Underground Splices: All underground outdoor splices when approved by Engineer shall be completed in an accessible pullbox or handhole using an approved watertight epoxy resin splice kit rated for the application up to 600 volts. Splices will not be allowed to be direct buried.

Conductor Identification

- 1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as favorably by the Engineer.
- 2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: For all circuits 150 volts to ground or more and for all motor circuits over ¹/₂ horsepower, test cables per NETA Paragraph 7.3.1. The insulation resistance shall be 20 megohms or more. Submit results to Engineer for review.

16.63 Signal Cable

[CSI 27 15 00]

Part 2 - Products

Materials

Twisted Shielded Pairs (TSP)

1. Cable shall conform to IEEE 383, UL 13, and UL 83 and shall be type PLTC cable suitable for direct burial. Each TSP shall consist of two #16 AWG, 7-strand copper conductors per ASTM B8 with 15 Mils PVC insulation and individual conductor jacket of nylon. Conductors shall be twisted with 2-inch or shorter lay, with 100 percent foil shielding and tinned copper drain wires. The cable shall have an overall PVC jacket with a thickness of 35 Mils. The insulation system shall be rated at 90 degrees Celsius and for operation at 600 volts.

Part 3 - Execution

Installation

Cable Installation

- 1. Cables shall be continuous from initiation to termination without splices.
- 2. Cable shielding shall be grounded at one end of the cable only. Bonding shall be to a single ground point only. Bonding from cable to cable in multiple run installations shall not be permitted.
- 3. Install instrumentation cables in separate raceway systems with voltages not to exceed 30 volts DC.

Conductor Identification

- 1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as determined by the Engineer.
- 2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: Perform insulation resistance on all circuits. Make these tests before any equipment has been connected. Test the insulation with a 500 Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 20 mega ohms or more. Submit results to Engineer for review.

16.70 RACEWAYS, BOXES, AND FITTINGS

[CSI 26 05 33]

16.71 Raceways

[CSI 26 05 33.23]

Part 1 – General

Design Requirements

Conduit sizes not noted on Plans shall be in accordance with NEC requirements for the quantities and sizes of wire installed therein.

Part 2 – Products

Components

Conduit and Fittings

- 1. Galvanized Rigid Steel (GRS): Rigid conduit shall be steel, hot dipped galvanized inside and out. The GRS must meet USA Standards Institute C80-1 Underwriters Laboratories Standard UL6 and carry a UL label. Use cast threaded hub fittings and junction boxes for all rigid conduit except in locations not permitted by the NEC.
- 2. Nonmetallic Conduit: Nonmetallic Conduit shall be rigid PVC, Schedule 40 (PVC-40) or 80 (PVC-80). PVC conduit installed above grade shall be Schedule 80 extra heavy wall 90 degree Celsius. UL listed for aboveground use and UV resistant. Conduit shall be gray in color. Fittings shall be of the same material as the raceway and installed with solvent per the Manufacturer's instructions. Conduit, fittings, and solvent shall all be manufactured by the same Manufacturer.
- 3. Flexible Metal Conduit (Flex-LT): Flexible conduit shall be interlocking single strip, hot dipped galvanized and shall have a polyvinyl chloride jacket extruded over the outside to form a flexible watertight raceway. Flexible conduit shall be American Brass Company Sealtite Type VA, General Electric Type UA or equal.

Conduit and Cable Supports

- 1. Conduit Supports: Hot dipped galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe straps used with galvanized clamp backs and nesting backs where required. Conduit support for PVC shall be one-hole PVC or epoxy coated clamps or PVC conduit wall hangers.
- 2. Ceiling Hangers: Ceiling hangers shall be adjustable galvanized carbon steel rod hangers. Unless otherwise specified, hanger rods shall be ¹/₂-inch all-thread rod and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

Conduit Sealants

- 1. Moisture Barrier Types: Sealant shall be a non-toxic, non-shrink, non-hardening, putty type hand applied material providing an effective barrier under submerged conditions.
- 2. Fire Retardant Types: Fire stop material shall be a reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL 1479. Provide products indicated by the manufacturer to be suitable for the type and size of penetration.

Part 3 - Installation

Raceway Applications

Galvanized Rigid Steel (GRS) conduit shall be used in all locations unless noted otherwise below or on the Plans.

ABOVE GRADE CONDUITS (non-corrosive areas) shall be:

1. GRS for power and control wiring.

2. GRS for instrumentation and telecommunications wiring.

CONCEALED ABOVE GRADE CONDUITS shall be:

- 1. GRS for all wire and cable types in wood stud frame walls.
- 2. PVC-40 for power and control wiring in concrete block or brick walls.
- 3. PVC-40 for instrumentation and telecommunications wiring in CMU or brick walls.

BELOW GRADE CONDUITS IN DIRECT EARTH (not under slabs-on-grade) shall be:

1. PVC-40 for power and control wiring. Conduit risers/sweeps shall be GRS.

ALL CONNECTIONS TO VIBRATING EQUIPMENT OR MOTORS shall be:

1. Liquidtight flexible metallic conduit for indoor, non-corrosive areas and all motor leads from VFDs.

Installation

All conduits shall be concealed in the floor, walls, ceiling slab, or beneath the floor slab. Surface mounted conduit will not be accepted unless noted otherwise on the construction Plans.

Size of Raceways:

- 1. Raceway sizes as shown on the Plans, if not shown on the Plans, then size in accordance with NFPA 70.
- 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a) Conduit: ³/₄-inch

All raceways shall contain a separate grounding conductor.

Spare conduits shall contain one 3/16-inch diameter nylon pull rope.

Conduit routing is shown diagrammatic on the Plans. Contractor is responsible for routing the conduits in a neat manner, parallel and perpendicular to walls and ceilings.

Location of conduit ends are shown approximately. Contractor is responsible for ending conduits in location that will not conflict with electrical equipment. Route conduit ends to facilitate ease of equipment maintenance. Conduits extending from the floor to a device shall be located as close as possible to avoid creating a hazard.

Conduit shall not be routed on exterior of structures except as specifically indicated on the Plans.

Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

Securely fasten raceways at intervals and locations required by NEC, or the type of raceway employed.

Provide all required openings in walls, floors and ceilings for conduit penetration.

1. Do not install one (1) inch and larger raceways in or through structural members (beams, slabs, etc.) unless approved by Engineer.

- 2. New Construction: Avoid cutting openings, where possible, by setting sleeves or frames in masonry and concrete, and by requesting openings in advance.
- 3. Existing Construction: Core drill openings in masonry and concrete. Avoid structural members and rebar.

Conduit encasement or embedment in the earth shall be separated from the earth by at least 3-inches of concrete unless otherwise shown on the Plans. Plastic conduit spacers shall be located five feet on centers. The spacers shall be secured to the conduits by wire ties. The conduits shall be watertight.

Analog signal conduits shall be separated from power or control conduits. The separation shall be a minimum of 12-inches for metallic conduits and 24-inches for nonmetallic conduits.

Install explosion-proof seal-offs in hazardous areas shown on the Plans and as required by the NEC.

Plastic raceway joints shall be solvent cemented in accordance with recommendations of raceway manufacturer.

All conduit openings not encased in a panel shall be sealed with duct seal.

16.72 Boxes and Enclosures

16.72.2 Outlet and Junction Boxes

[CSI 26 05 33.16]

Part 1 – General

Design Requirements

In corrosive areas, all junction boxes shall be NEMA 4X.

Outlet boxes and switch boxes shall be designed for mounting flush wiring devices.

Outlet boxes shall not be less than 4-inch square and 1¹/₂-inch deep. Ceiling boxes shall withstand a vertical force of 200 pounds for five minutes. Wall boxes shall withstand a vertical downward force of 50 pounds for five minutes.

Part 2 – Products

Materials

Use cast boxes with threaded hubs for all rigid and intermediate conduits. Steel boxes may be used with rigid and intermediate conduits where cast boxes are not allowed by the NEC. All boxes shall be of proper size to accommodate devices, connectors, and number of wires present in the box. Boxes shall be readily accessible.

Cast box bodies and cover shall be cast or malleable iron with a minimum wall thickness of ¹/₈-inch at every point, and not less than ¹/₄-inch at tapped holes for rigid conduit. Bosses are not acceptable. Mounting lugs shall be provided at the back or bottom corners of the body. Covers shall be secured to the box body with No. 6 or larger brass or bronze flathead screws. Boxes shall be provided with neoprene cover gaskets. Outlet boxes shall be of the FS types. Boxes shall conform to FS W-C-586C and UL 514.

Sheet metal boxes shall conform to UL 50, with a hot-dipped galvanized finish conforming to ASTM A123. Boxes and box extension rings shall be provided with knockouts. Boxes shall be formed in one piece from carbon-steel sheets.

Non-metallic boxes shall be hot-compressed fiberglass, one-piece, molded with reinforcing of polyester material, with a minimum wall thickness of ¹/₈-inch.

Finishes

Where only cast aluminum is available for certain types of fixture boxes, an epoxy finish shall be provided.

16.72.3 Watertight Enclosures

[CSI 26 05 33.17]

Part 2 – Products

Manufacturers

The watertight enclosure shall be equal to Hoffman.

Materials

Watertight enclosures for vault electrical outlets shall be molded from fiberglass reinforced polyester material. A hinged cover shall be gasketed and opened with quick release latches. The conduit penetrations shall be sealed watertight.

Part 3 – Execution

Installation

An epoxy plug shall be installed in the conduit to prevent the migration of water into the conduit. The enclosure shall be NEMA rated and installed per all applicable codes.

16.75 Wiring Devices

[CSI 26 27 26]

16.75.1 Common Work for Wiring Devices

[CSI 26 27 26]

Part 3 - Execution

Installation

Wiring Devices

1. Position of Outlets: All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room or outside the structure. Device outlets shall be set plumb and shall extend flush to the finished surface of the wall, ceiling or floor without projecting beyond the same.

2. Unless otherwise noted, wall mounted outlet devices shall generally be 24-inches above the floor, 18 inches in architecturally treated areas, above process piping near process valve boards. Switches shall be 48 inches above the finished floor unless otherwise noted.

Installation of Wall Plates

- 1. Interior Dry Locations: Install plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filled will not be permitted. Do not use oversize plates or sectional plates.
- 2. Exterior and/or Wet Locations: Install plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. For receptacle devices, these plates shall maintain the weatherproof rating with an attachment plug inserted and be rated extra-duty. Cover type shall match box type.

Testing

After installation of receptacles, circuits shall be energized, and each receptacle tested for proper ground continuity, reversed polarity, and/or open neutral condition.

GFI receptacles shall be tested with the circuits energized. Devices shall be tested with a portable GFI receptacle tester capable of circulating 7.5 milliamperes of current, when plugged in, between the "hot" line and "ground" to produce tripping of the receptacle. Resetting and tripping shall be checked at least twice at each GFI receptacle.

Submit results of all field testing to the Engineer for review.

16.75.2 Receptacles

[CSI 26 27 19]

Part 1 – General

Design Requirements

Receptacles shall be heavy duty, high abuse, grounding type conforming to NEMA configurations, NEMA WD1 and UL 514 Standards.

Part 2 – Products

Materials

Single and Duplex Receptacles

- 1. Indoor Clean Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-15P plug caps. Receptacles shall be Hubbel 5362, General Electric 4108-2, or equal. Color shall be brown in industrial areas and ivory or white in office and laboratory areas.
- Outdoor, Process, or Corrosive Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant, marine duty with yellow polycarbonate weatherproof lift covers. Receptacles shall be Hubbell 53CM62/53CM21 or equal.

GFI Receptacles

1. Device shall be rated 20 amp, 2-pole, 3-wire, 120-volt, conforming to NEMA WD1.10 configuration. Device shall have a test and reset push buttons. GFI device shall be Hubbell 5362 or equal.

Surface Multiple Outlet Assemblies

1. Units shall have outlets on center-to-center spacing as shown on the Plans. Assembly shall conform to Article 353 of the NEC.

16.75.3 Line Voltage Switches

[CSI 26 27 26.21]

Part 2 – Products

Manufacturers

- Sierra Electric
- Monumental Grade, Catalog No. 5721
- Daniel Woodhead 1900 series
- Or Equal

Materials

Line Voltage Types: Switches shall be rated 20 amps at 120 or 277 volts AC only. Units shall be flush mounted, self-grounding, quiet operating toggle devices. Handle color shall be brown in industrial areas and white or ivory in office or laboratory areas. Units shall conform to Federal Specifications W-S-896 D and E, UL 20, and NEMA WD1 standards.

16.75.5 Plates

[CSI 26 27 26.31]

Part 1 – General

Design Requirements

Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform to NEMA WD1, UL 514, and ANSI C73. In noncorrosive indoor areas, device plates shall be made of sheet steel, zinc electroplated with chrome finish.

Device plates in corrosive or outdoor areas shall be corrosion-resistant/marine-duty type with weather protective double doors. Device plates for explosion-proof equipment shall be factory provided with the equipment.

Part 2 – Products

Manufacturers

As manufactured by

• Crouse-Hinds

- Appleton
- Or Equal

Components

Device plates shall be provided with engraved laminated phenolic nameplates with ¹/₈-inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single-phase.

16.85 Lighting

[CSI 26 50 00]

16.85.1 Common Work for Lighting Fixtures

[CSI 26 50 05]

Part 1 - General

Design Requirements

Fixtures shall be a standard, cataloged item general description as called for on the Plans. All fixtures shall be UL approved and so labeled. Provide suitable supports and mountings.

Part 2 – Products

Manufacturers

As shown on Plans. Equals will be accepted.

16.85.2 Lamps

[CSI 26 06 50 or 26 50 06.13]

Part 1 - General

Design Requirements

Provide all lamps as specified. Refer to the Lighting Fixture Schedule on the Plans for the ordering information on lamps. Fluorescent lamps shall be standard type, not energy efficient type due to low temperature conditions. Lamps shall be new at the time of acceptance.

Lamps shall be provided for all lighting fixtures.

Warranty

Lamps that fail within 90 days after acceptance by the Owner shall be replaced at no cost to the Owner.

Part 2 – Products

Manufacturers

Approved manufacturers:

- Westinghouse
- Sylvania
- G.E.

16.85.3 Fixtures

[CSI 26 06 50.16 or 26 50 06.16]

Part 1 - General

Design Requirements

Fixtures shall be of the types, wattages, and voltages shown on the Plans, comply with UL 57, and shall be UL classified and labeled for intended use. Fixtures for use in hazardous locations shall be UL listed per UL Standard 844.

16.85.4 Ballast

[CSI 26 50 06.18]

Part 1 - General

Design Requirements

Fluorescent lamp ballast shall be UL "P" rated. Ballast shall be CBM certified and bear the UL label. Ballast shall be General Electric Maxi-Miser II, Advance Mark II, or equal.

Ballasts in luminaries for exterior use shall provide reliable starting of lamps at 0 degrees Fahrenheit at 90 percent of the nominal line voltage. All locations, other than totally enclosed rooms, shall be considered exterior.

Warranty

Ballasts producing excessive noise (above 36 dB) or vibration will be rejected and shall be replaced at no expense to the Owner.

16.90 SENSORS AND CONTROLS

16.90.1 Common Work for Sensors and Controls

Part 1 – General

Design Requirements

Provide sensors and controls scaled and rated for their intended application.

Part 3 – Execution

Installation

All devices shall be installed to be field serviceable without taking the facility out of service. Readouts shall be positioned to be easily read from a standing position, central to the room unless allowed otherwise by the Engineer.

16.92.10 Gauge Pressure Transmitter

Part 1 – General

Design Requirements

Provide transmitter with ¹/₄-inch or ¹/₂-inch process connections or as shown on the plans if different, and completely suitable for measuring pressure in non-potable water. Select ranges to provide a system that utilizes the largest percentage of available span for each transmitter. Transmitter shall transmit in pounds per square inch displayed at the device screen and through the 4-20mA output.

Location	Low end of range	High end of range
Vault Building	0 psi	200 psi

Part 2 – Products

Manufacturers

Pressure transmitter shall be Foxboro IGP10-T22D1F-L1, no substitutions.

Manufactured Units

Pressure transmitters shall be all solid state with a 4-20ma output. All wetted parts shall be stainless steel. Transmitter shall be hermetically sealed to withstand submergence or an operating environment of 100 percent humidity for an indefinite period of time. Total error band shall not exceed 0.25 percent of full scale over a temperature range of 0-100 degrees Celsius. Voltage input shall be 9 to 20 VDC without more than a 0.12 percent change in output. Volumetric displacement of bridge from 0 psi to max-rated pressure shall be less than 0.01 cubic inches. Provide electronics with built-in protection against AC line transients and lightning spikes, and an R/F filter to reject external electrical and internal noise. Zero and span adjustments shall be non-interacting.

A digital indicator with on-board pushbuttons shall be provided to display the measurement with a choice of units. The pushbuttons shall allow zero and span adjustments and local configuration without the need for a hand-held terminal.

Part 3 – Execution

Installation

Transmitter installations shall be equipped with drain and bleed and isolation valves to remove air from transmitter diaphragm. Contractor shall be completely responsible for proper operation and interface of transmitter with other electronics provided on the project.

16.93.3 Wall-Mounted Heating Thermostat

Part 1 – General

Related Sections

• Division 11.95.83.33 Radiant Space Heater

Design Requirements

Provide a 24 volt, SPST wall mounted heating thermostat. All components shall be suitable for installation in the environment where installed. Thermostat shall be as recommended by the space heater manufacturer. Thermostat shall have an adjustable range from 40 to 100 degrees Fahrenheit. Set thermostat at 60 degrees Fahrenheit unless specified otherwise on the plans.

Part 2 – Products

Manufacturer

The wall-mounted heating thermostat shall be a Honeywell TH6110D1005, or equal.

Part 3 – Execution

Installation

Furnish and install wall-mounted thermostat as shown on the Plans. Mount thermostat 4 feet above finished floor in location shown on the Plans.

16.95 TESTING

[CSI 26 08 00]

16.95.1 Common Work for Testing

[CSI 26 08 05]

Part 1 - General

Submittals

Test reports shall be submitted to the Engineer prior to final acceptance in accordance with Division 1.33 of these specifications.

Scheduling and Coordination

The Contractor shall inform the Engineer in advance of testing in accordance with the requirements listed in Division 1 of these specifications.

Prior to scheduling the testing, the Contractor shall have satisfied themselves that the project area is properly cleaned up; all patching and painting deemed necessary properly completed; and all systems, equipment and controls are functioning as intended.

Part 2 - Products

Source Quality Control

Submit reports of factory tests and adjustments performed by equipment manufacturers to the Engineer prior to field testing and adjustment of equipment. These reports shall identify the equipment and show dates, results of test, measured values and final adjustment settings. Provide factory tests and adjustments for equipment where factory tests are specified in the equipment specifications. The Engineer may inspect the fabricated equipment at the factory before shipment to job site. Provide the Engineer with sufficient prior notice so that an inspection can be arranged at the factory.

Part 3 – Execution

Site Testing

Test all circuits for continuity, freedom from ground, and proper operation during progress of the work.

Insulation Resistance, Continuity, and Rotation: Perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior and in addition to tests performed by the testing laboratory specified herein.

Electric Motors: Perform voltage, current and resistance tests on all motors ¹/₂ horsepower and larger installed this project. Insulation resistance readings shall be taken with a 500-volt megger for 30 seconds with the circuit conductors connected to the motor. Verify that an overload condition does not exist.

Conduct special test as required for service and/or system ground.

Arc Flash Study, Protection Device Coordination, and Short Circuit Analysis

[CSI 26 05 73.13, 26 05 73.16, 26 05 73.19]

Provide the services of a recognized independent testing laboratory or coordination analysis consultant for the proper system coordination of the protective devices furnished on this project. Submit the name and the qualifications of the laboratory or consultant for review by the Engineer; qualifications must include professional registration of proposed personnel as electrical engineers.

The protective device on the line side closest to the fault or abnormal conditions shall isolate the problem portion of the system and minimize damage in that portion. The rest of the system shall be maintained in normal service. The coordination shall be in conformance with the recommendations of latest IEEE Standard 242.

Provide an Arc Flash Hazard Study for the electrical distribution system shown on the Plans. The intent of the Arc Flash Hazard Study is to determine hazards that exist at each major piece of electrical equipment shown on the one-line diagrams. This includes switchgear, switchboards, panelboards, motor control centers, generators, transfer switches, and transformers. The study will include creation of Arc Flash Hazard Warning Labels listing all items as required in NFPA 70E-2018. These labels serve as a guide to assist technicians and others in the selection of proper Personal Protective Equipment when working around exposed and energized conductors. The electrical contractor will install the labels. The arc flash hazard study shall consider all operating scenarios during normal conditions alternate operations, emergency power conditions, and any other operations, which could result in maximum arc flash hazard. The label shall list the maximum incidental energy calculated and the scenario number and description on the label.

Submit the analysis that shall include arc flash, impedance, and short circuit calculations, list of any assumptions made and the analysis, the recommended settings of the protective devices, and the system time/current characteristic curves. The submittal shall be completed and submitted in conjunction with the circuit breaker submittal to allow time for review and

re-submittal, if necessary, before the implementation of final settings and adjustments by the testing laboratory.

Field Quality Control

General

1. Conduct final test in the presence of Owner and/or their authorized representative. Contractor shall provide all testing instrumentation and labor required to demonstrate satisfactory operation of systems, equipment and controls.

Operational Tests

1. Operational test all circuits to demonstrate that the circuits and equipment have been properly installed, adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions, and demonstrate satisfactory interfacing with the data acquisition and alarm systems.

16.95.3 Conductor Test Report

[CSI 26 08 13]

Conductor Test Report Page 1 of 1														
PROJECT: OWNER:														
Contra Tested	ctor (bv [.]	Co. N	lame:	e: Phone Number: Test Date:										
Race- way	V	С		Operating Load Voltage				Insulation Resistance - OHMS						
Label	(2)	(3)	VAB	VCB	VCA	VAN	VBN	VCN	A-B	B-C	C-A	A-G	B-G	C-G
А														
В														
С														
D														
Е														
F														
G														

1. Refer to raceway and wire schedule and one-line diagram for description of feeder identified by label shown on this report

- 2. Visual Inspection Check when completed
- 3. Continuity Test Check when completed

16.95.4 Ground Electrode Resistance Test Report

[CSI 26 08 15]

Ground Electrode Resistance Test Report				
PROJECT:	OWNER:			
Contractor Co. Name:	Phone Number:			
Tested by:	Test Date:			
The AMERICAN THE SECOND				
Test Meter Type:				
Test Distance-D:				
Soil Conditions:				
Measured Resistance:				
DESCRIPTION OF TEST PROCEDURE, CONI	DITIONS, RESULTS:			

Division 17 Automatic Control (Not Used This Contract)

18.0 GENERAL

It is the intention of these specifications that performance of work under bid items shall result in complete construction, in proper operating condition, of improvements identified in these written specifications and accompanying plans. Work and material not specifically listed herein but required according to the plans and specifications and general practice shall be included in Contractor's bid price in the most closely applicable bid item.

If a minimum bid amount has been established for any item and the bidder's entry is less than the minimum specified amount, the Owner will unilaterally revise the price to the minimum specified amount and recalculate the total. The recalculated total will be used by the Owner for award purposes and to fix the contract price amount and the amount of the contract bond.

If a maximum or fixed bid amount has been established for any item and the bidder's entry exceeds the maximum or fixed specified amount, the Owner will reduce the bid item price to the maximum or fixed specified amount and relocate the offsetting amounts to bid items of the Owner's choosing.

Bid Item 1 – Mobilization, Demobilization and Site Cleanup

Lump sum price covers complete cost of furnishing, installing and testing, complete and in-place, all work and materials necessary to: move and organize equipment and personnel onto the job site; secure job site; traffic control for deliveries; provide and maintain necessary support facilities; obtain all necessary permits and licenses; prepare site for construction operations; maintain site and surrounding areas during construction; provide system testing, move all personnel and equipment off site after contract completion; cleanup site prior to final acceptance; and accomplish all other items of work not specifically listed in other divisions.

This bid item may not exceed 10-percent of the total bid price. Up to 50-percent of this bid item will be paid once 5-percent of the total original contract amount is earned. The final 50-percent of this bid item shall be paid with the final pay estimate.

Bid Item 2 – Trench Safety and Shoring

Lump sum price shown shall cover the complete cost of trench safety and shoring including: all labor, materials, and equipment for the installation of the trench safety and shoring work as shown on the Plans, and detailed in the contract specifications, or as required by governing safety codes. Price includes design of the shoring system as required by applicable codes and standards, whether shown on the Plans or not. Payment shall be lump sum.

Bid Item 3 – Staking and Project Control

Lump sum price shown shall cover the complete cost of providing all surveying and staking control necessary to construct the improvements and provide permanent control references. Also included is the cost to survey and replace any existing monuments or markers disturbed during construction. Payment shall be lump sum.

Bid Item 4 – Temporary Sedimentation and Erosion Control

Lump sum price shown shall cover the complete cost of providing all temporary erosion and sedimentation control relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: silt fence, temporary trenching, temporary mulching, plastic sheeting, hydroseed, construction sedimentation control ponds and/or tanks; control of surface water; and restoration of damage caused by storm events, and all other work necessary, for a complete installation of all temporary sedimentation and erosion control facilities. Payment shall be lump sum.

Bid Item 5 – Vault Installation and Excavation

Lump sum price shown shall cover the complete cost of the vault and providing all work relating to placement of the vault as shown on the Plans and specified herein. Work includes, but is not limited to: structure excavation, backfill, and compaction; removal of unsuitable materials; select bedding; backfill; appurtenances; ladder; grating; bentonite water stops; coatings; supports, and all other work necessary for a complete installation of the vault. Payment shall be lump sum.

Bid Item 6 – Ductile Iron Pipe, Fittings and Appurtenances.

Lump sum price shall cover the complete cost of providing all materials, equipment and labor necessary for the installation of the water main. Work includes: pipe (to exterior face of vault and D-Station); fittings; joining; trenching, excavation, haul and disposal of unsuitable material and excess material; thrust restraint; procurement, haul and placement of bedding and backfill; compaction; restoration; temporary surface patching; disinfecting; testing and all other work for a complete installation.

Payment for pipe will be paid no more than 90-percent of the length installed if it has not yet passed both pressure and purity testing. Payment shall be lump sum.

Bid Item 7 – Unscheduled Excavation

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for excavation and disposal that is beyond the limits shown on the project plans and is performed at the Owner's request.

Price includes haul and disposal of excavated material. Measurement shall be per cubic yard as measured in place.

Bid Item 8 – Unscheduled Backfill

The unit price shown shall cover the complete cost of providing all materials, equipment, and labor necessary for unscheduled backfill that is beyond the limits shown on the project plans and is performed at the Owner's request.

Payment shall be per cubic yard of material as measured in place.

Bid Item 9 – Dewatering

Lump sum price shown shall cover the complete cost of dewatering system design and approval to meet the requirements identified in these specifications, construction and maintenance of the dewatering system, and disposal of the excess groundwater. Payment shall be lump sum.

Bid Item 10 – Site Restoration

Lump sum price shown shall cover the complete cost of providing all labor, materials and equipment necessary for any site restoration shown on the Plans and detailed in the contract specifications. Work includes: procurement, haul, compaction, restoration, watering and placement of crushed rock to the depth shown on the Plans; removal and disposal of temporary surface patching, and chain-link fencing. Payment shall be lump sum.

Bid Item 11 – Structural

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary to construct the building as shown on the Plans, and detailed in the contract specifications including: cast-in-place concrete landing; miscellaneous metal work; doors; walls; openings; ceilings; insulation; carpentry; rafters; hatches; roof; waterproofing; patching; siding and repairing. Payment shall be lump sum.

Bid Item 12 – Mechanical in Meter Vault and D-Station

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the mechanical work shown on the Plans, and detailed in the contract specifications, including all mechanical work and equipment in the Meter Vault and D-Station to the exterior walls of the vault and D-Station. Payment shall be lump sum.

Bid Item 13 – Electrical

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the electrical and control work shown on the Plans and detailed in the contract specifications. Payment shall be lump sum.

Bid Item 14 – Construction Records

Lump sum price shown shall cover the complete cost of providing all mark-up plans necessary for the Owner to create accurate as-built construction records as detailed in the specifications. The work includes surveying all structures and utilities to determine their as-constructed locations and elevations, records of all mechanical and electrical equipment for maintenance purposes, and operation and maintenance manuals. The price for this work will be \$1,500. Failure to comply with the as-built requirements and furnish acceptable as-built records will result in the deletion of this bid item by change order.

Payment for this work will not be made prior to the final payment. Payment shall be lump sum.

Appendix A – Inadvertent Discovery Plan D Station Flow and Control Improvements



INADVERTENT DISCOVERY PLAN PLAN AND PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6000 or visit <u>https://ecology.wa.gov/accessibility</u>. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.

Site Name(s): D Station at BP	Location: 48°52'41"N -122°43'30"W
Project Lead/Organization: Whatcom County PUD No. 1	County: Whatcom

If this Inadvertent Discovery Plan (IDP) is for multiple (batched) projects, ensure the location information covers all project areas.

1. INTRODUCTION

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, as part of Agency Terms and Conditions for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive 21-02 or Section 106).

Once completed, **the IDP shall always be kept at the project site** during all project activities. All staff, contractors, and volunteers shall be familiar with its contents and know where to find it.

2. CULTURAL RESOURCE DISCOVERIES

A cultural resource discovery could be prehistoric or historic artifacts. Examples include (see images for further examples):

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.
- Old munitions casings. *Always assume these are live and never touch or move.*
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items,

toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource.

3. ON-SITE RESPONSIBILITIES

If any employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the project, take the following steps to *Stop-Protect-Notify*. If you suspect that the discovery includes human remains, also follow Sections 5 and 6.

STEP A: Stop Work.

All work must stop immediately in the vicinity of the discovery.

STEP B: Protect the Discovery.

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary (30 feet or larger) with temporary fencing, flagging, stakes, or other clear markings. Provide protection and ensure integrity of the discovery until cleared by the Department of Archaeological and Historical Preservation (DAHP) or a licensed, professional archaeologist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until the requirements of this IDP are met.

STEP C: Notify Project Archaeologist (if applicable).

If the project has an archaeologist, notify that person. If there is a monitoring plan in place, the archaeologist will follow the outlined procedure.

STEP D: Notify Project and Washington Department of Ecology (Ecology) contacts.

Project Lead Contacts

Primary C	<u>contact</u>	Alternate Contact			
Name:	Kurt Wank	Name:	Garrett Love-Smith		
Organizat	ion: Whatcom Co.PUDNo. 1	Organizatio	n: Whatcom Co.PUDNo. 1		
Phone:	360-384-4288	Phone:	360-384-4288 ext 26		
Email:	kurtwank@pudwhatcom.org	Email: garr	ettl@pudwhatcom.org		

Ecology Contacts (completed by Ecology Project Manager)

Ecology Project Manager	Email:
Name:	Alternate or Cultural Resource Contact
Program:	Name:
Phone:	Program:

Phone:

Email:

STEP E: Ecology will notify DAHP.

Once notified, the Ecology Cultural Resource Contact or the Ecology Project Manager will contact DAHP to report and confirm the discovery. To avoid delay, the Project Lead/Organization will contact DAHP if they are not able to reach Ecology.

DAHP will provide the steps to assist with identification. DAHP, Ecology, and Tribal representatives may coordinate a site visit following any necessary safety protocols. DAHP may also inform the Project Lead/Organization and Ecology of additional steps to further protect the site.

Do not continue work until DAHP has issued an approval for work to proceed in the area of, or near, the discovery.

DAHP Contacts:

Name: Rob Whitlam, PhD Title: State Archaeologist Cell: 360-890-2615 Email: <u>Rob.Whitlam@dahp.wa.gov</u> Main Office: 360-586-3065

Human Remains/Bones:

Name: Guy Tasa, PhD Title: State Anthropologist Cell: 360-790-1633 (24/7) Email: <u>Guy.Tasa@dahp.wa.gov</u>

4. TRIBAL CONTACTS

In the event cultural resources are discovered, the following tribes will be contacted. See Section 10 for Additional Resources.

Tribe:	Lummi		
Name:	Lena Tso	Tribe:	Nooksack
Title		Name:	Trevor Delgado
Phone:	360) 384-2280	Title:	THPO
Empil:	lonot@lummi non gov	Phone:	(360) 592-5140 x3234
Lillall.	ienat@iummi-nsn.gov	Email:	tdelgado@nooksack-nsn.gov

Please provide contact information for additional tribes within your project area, if needed, in Section 11.

5. FURTHER CONTACTS (if applicable)

If the discovery is confirmed by DAHP as a cultural or archaeological resource, or as human remains, and there is a partnering federal or state agency, Ecology or the Project Lead/Organization will ensure the partnering agency is immediately notified.

Not Applicable

6. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL REMAINS

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Follow the steps under *Stop-Protect-Notify*. For specific instructions on how to handle a human remains discovery, see: <u>RCW</u> 68.50.645: Skeletal human remains—Duty to notify—Ground disturbing activities— Coroner determination—Definitions.

Suggestion: If you are unsure whether the discovery is human bone or not, contact Guy Tasa with DAHP, for identification and next steps. Do not pick up the discovery.

Guy Tasa, PhD State Physical Anthropologist

Guy.Tasa@dahp.wa.gov

(360) 790-1633 (Cell/Office)

For discoveries that are confirmed or suspected human remains, follow these steps:

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts below. **Do not call 911** unless it is the only number available to you.

Enter contact information below (required):

- Local Medical Examiner name and phone: Alison Hunt (360) 738-4557
- Local Law Enforcement main name and phone: Whatcom County Sheriff 360-778-6600
- Local Non-Emergency phone number (911 if without a non-emergency number): 360-778-6600
- 2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.

3. DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.

4. If the remains are determined to be non-forensic, cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

- Per <u>RCW 27.44.055</u>, <u>RCW 68.50</u>, and <u>RCW 68.60</u>, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation. The Project Lead/Organization may also participate in consultation.
- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in <u>RCW 27.44.055</u>, <u>RCW</u> <u>68.50</u>, and <u>RCW 68.60</u>.
- When consultation and documentation activities are complete, work in the discovery area may resume as described in Section 8.

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation

Act of 1990 (NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the Project Lead/Organization will comply with applicable state and federal laws, and the above protocol.

7. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological resources discovered during construction are protected by state law <u>RCW 27.53</u> and assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

The Project Lead/Organization must ensure that proper documentation and field assessments are made of all discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and the archaeologist.

An archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. They will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures. They will document discovery locations on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units. They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below surface and stratum association where applicable) for all recovered artifacts. They will draw a stratigraphic profile for at least one wall of each test excavation unit.

The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units. The ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology, and the affected tribe(s).

Within 90 days of concluding fieldwork, the archaeologist will provide a technical report describing any and all monitoring and resultant archaeological excavations to the

Project Lead/Organization, who will forward the report to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s) for review and comment.

If assessment activities expose human remains (burials, isolated teeth, or bones), the archaeologist and Project Lead/Organization will follow the process described in **Section 6**.

8. PROCEEDING WITH WORK

The Project Lead/Organization shall work with the archaeologist, DAHP, and affected tribe(s) to determine the appropriate discovery boundary and where work can continue.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the federal agencies (if any) determine that compliance with state and federal laws is complete.

9. ORGANIZATION RESPONSIBILITY

The Project Lead/Organization is responsible for ensuring:

- This IDP has complete and accurate information.
- This IDP is immediately available to all field staff at the site and available by request to any party.
- This IDP is implemented to address any discovery at the site.
- That all field staff, contractors, and volunteers are instructed on how to implement this IDP.

10. ADDITIONAL RESOURCES

Informative Video

Ecology recommends that all project staff, contractors, and volunteers view this informative video explaining the value of IDP protocol and what to do in the event of a discovery. The target audience is anyone working on the project who could unexpectedly find cultural resources or human remains while excavating or digging. The video is also posted on DAHP's inadvertent discovery language website.

Ecology's IDP Video (https://www.youtube.com/watch?v=ioX-4cXfbDY)

Informational Resources

DAHP (https://dahp.wa.gov)

<u>Washington State Archeology (DAHP 2003)</u> (https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf) Association of Washington Archaeologists (https://www.archaeologyinwashington.com)

Potentially Interested Tribes

<u>Tribal Contacts: Interactive Map of Tribes by Area</u> (<u>https://dahp.wa.gov/archaeology/tribal-consultation-information</u>)

<u>Tribal Contacts - WSDOT Tribal Contact Website</u> (https://wsdot.wa.gov/tribal/TribalContacts.htm)

11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Design Engineers

RH2 Dan Burwell, 360 684-1548 dburwell@rh2.com Orin Paul 360 684-1556 opaul@rh2.com

Chipped stone artifacts.

Examples are:

- Glass-like material.
- Angular material.
- "Unusual" material or shape for the area.
- Regularity of flaking.
- Variability of size.



Stone artifacts from Oregon.



Stone artifacts from Washington.



Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.

Ground stone artifacts.

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.



Above: Fishing Weight - credit <u>CRITFC</u> Treaty Fishing Rights website.



Artifacts from unknown locations (left and right images).



Bone or shell artifacts, tools, or beads.

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a "shoehorn".
- Variability of size.
- Beads from shell (dentalium) or tusk.









Upper Left: Bone Awls from Oregon.

Upper Center: Bone Wedge from California.

Upper Right: *Plateau dentalium choker and bracelet, from <u>Nez Perce</u> <u>National Historical Park</u>, 19th century, made using <u>Antalis pretiosa</u> shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, <u>Public Domain</u>.*

Above: Tooth Pendants.

Right: Bone Pendants. Both from Oregon and Washington.



Culturally modified trees, fiber, or wood artifacts.

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.



Left and Below: *Culturally modified tree* and an old carving on an aspen (Courtesy of DAHP). These are examples of above ground cultural resources.

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry.*









Strange, different, or interesting looking dirt, rocks, or shells.

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- "Unusual" accumulations of rock (especially fire-cracked rock).
- "Unusual" shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a "layer cake" appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the "unusual" or out of place (for example, rock piles in areas with otherwise few rocks).



Shell Midden pocket in modern fill discovered in sewer trench.



Underground oven. Courtesy of DAHP.

Shell Midden with fire cracked rock.





Hearth excavated near Hamilton, WA.

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.



Left: Top to Bottom: *Willow pattern serving bowl* and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.

Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*







Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.



Main Image: Dishes, bottles, work boot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.





Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*




Implement the IDP if you see...

- Old munition casings if you see ammunition of any type *always assume they are live and never touch or move!*
- Tin cans or glass bottles with an older manufacturer's technique maker's mark, distinct colors such as turquoise, or an older method of opening the container.



Implement the IDP if you see... Historic foundations or buried structures. Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.







Counter Clockwise, Left to Right: *Historic structure 45Kl924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-Kl-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks (above ground historic resources) uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

Implement the IDP if you see...

Potential human remains.

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation* (45KI1200).

Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.





Directly Above: *This is a real discovery at an Ecology sewer project site.*

What would you do if you found these items at a site? Who would be the first person you would call?

Hint: Read the plan!

APPENDIX A

Department of Labor & Industries Whatcom County Prevailing Wage Rates & Benefit Codes

(Current rates effective September 2021 at the website listed below)

https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx